CANADIAN MACHINERY AND MANUFACTURING NEWS

A weekly newspaper covering in a practical manner the mechanical power, foundry and allied fields.
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Brown & Sharpe

A Shop Is Rated On Its Equipment

Tools are the foundation of a shop. A well equipped tool room is the basis for high grade work.

The shops that are recognized for their high standards of accuracy are the places where you find the tool rooms equipped with reliable

Brown & Sharpe Machinists Tools

Brown & Sharpe Mfg. Co.

Providence, R.I. U.S.A.

You Need a Good Die Stock Set

if you need one at all.

Because a **GOOD** Die Stock Set embodies:

1. Accuracy in its product.
2. Adjustment for wear.
3. Free cutting qualities.
4. Provision for sharpening.
5. Ample adjustment for oversize or undersize.

P. & W. Die Stock Dies **ARE GOOD DIES.**

BETTER than most because of the interchangeable feature in their chasers. A broken chaser in a P. & W. Die doesn't mean a new set of chasers. You can get a new chaser to replace a breakage and the new one "fits in" perfectly in your old set. That's the 6th point **"ECONOMY IN OPERATION."**

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Works: Dundas, Ontario

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PRATT & WHITNEY.

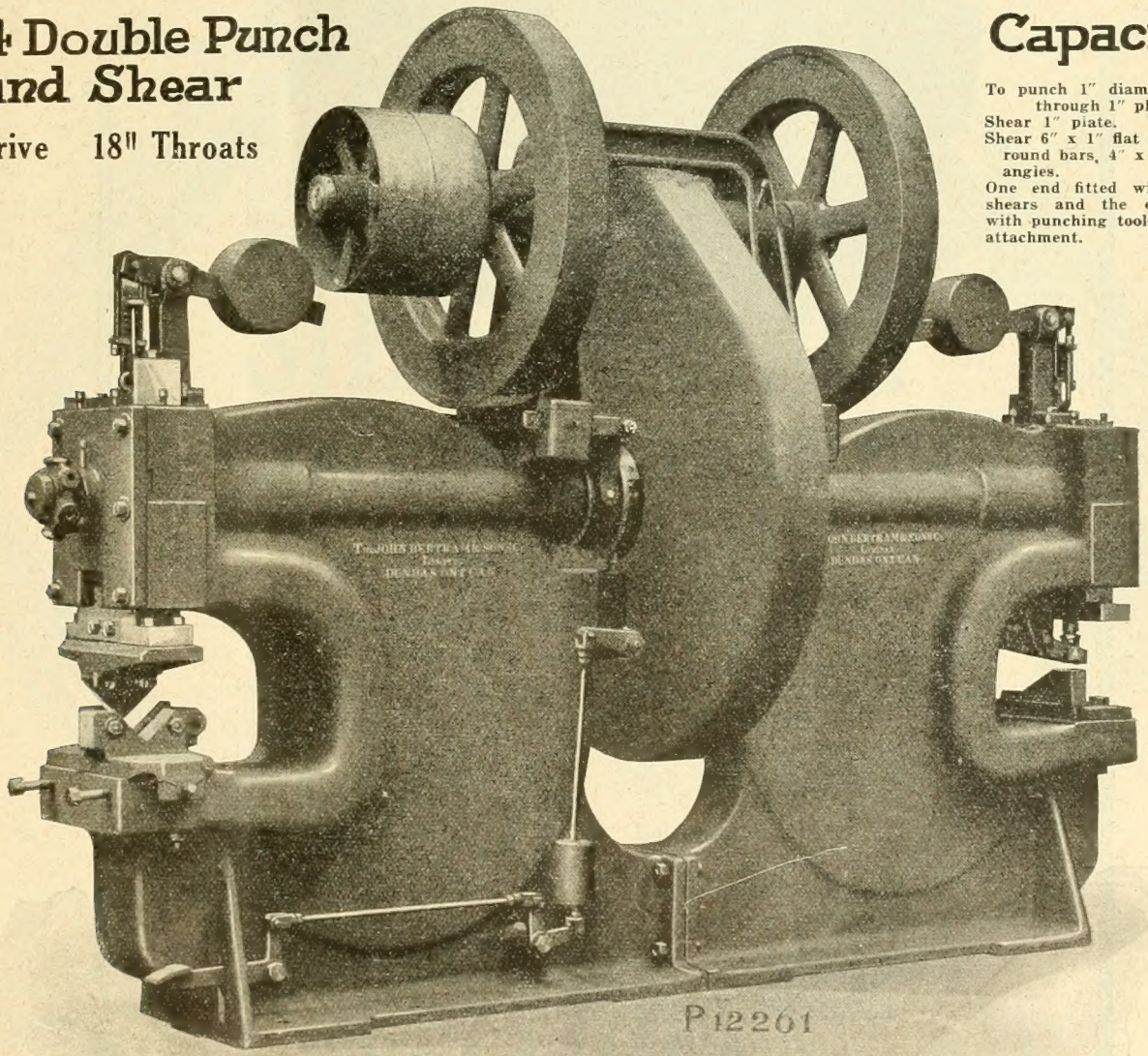
The BERTRAM Page

MACHINE TOOLS

JBSCO

No. 4 Double Punch and Shear

Belt Drive 18" Throats



Capacity

To punch 1" diameter holes through 1" plate.
Shear 1" plate.
Shear 6" x 1" flat bars, 1¾" round bars, 4" x 4" x ⅜" angles.
One end fitted with Angle shears and the other end with punching tools and gag attachment.

The John Bertram & Sons Co., Limited

DUNDAS. ONTARIO. CANADA.

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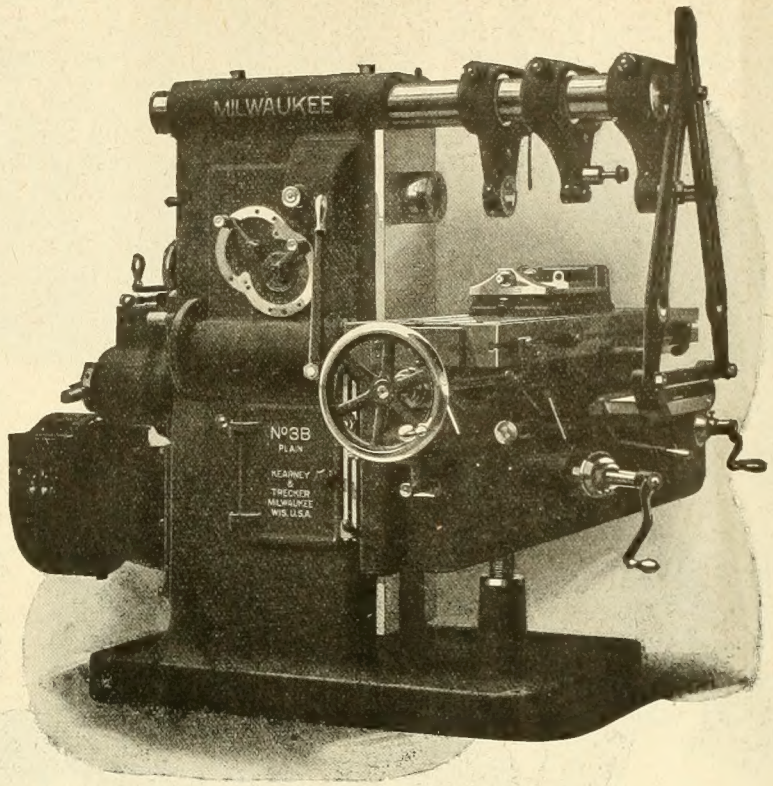

MILWAUKEE MILLING MACHINES

Double Overarm maintains alignment.

It is impossible for the operator to place the arbor supports on the arbor and double overarm in any other way than in line. Arbor cannot be pounded out of line when using large, coarse pitch cutters on rough, heavy work.

Other Distinctive Milwaukee Features:

Solid top knee—hardened steel gearing and shafts in the column and feed box—automatic flooded lubrication — one and one-half gallons of oil per minute pouring over all gears and bearings in the column and feed box, insuring lubrication at all times—flanged spindle with hardened steel collar for driving arbors—constant speed drive, reverse being self-contained.

Send for our No. 21 Catalogue. Illustrating and describing Milwaukee Milling Machines and accessories in detail

KEARNEY & TRECKER CO.
MILWAUKEE, WIS. U.S.A.

By Product Coke

Hamilton Pig Iron

Open Hearth
Steel Billets

Steel and
Iron Bars

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Drop
Forgings

Quality

THE

STEEL COMPANY

OF

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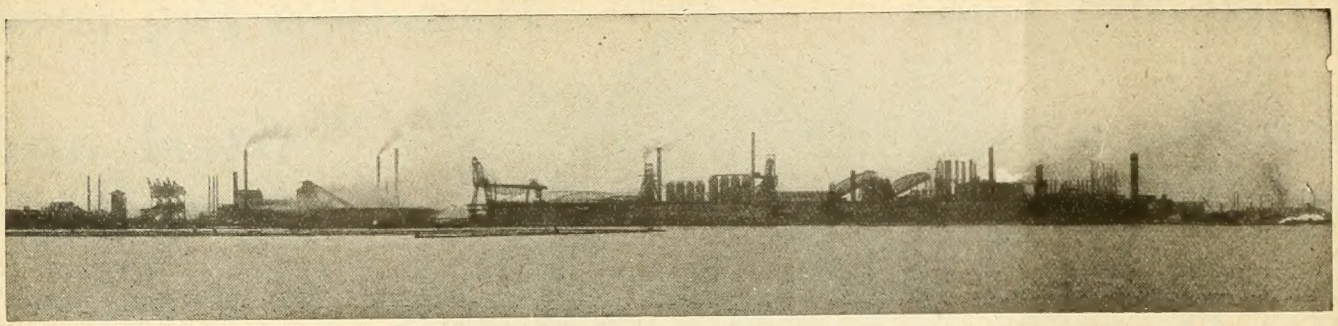

General View of the Plant of the Algoma Steel Corporation from the Waterfront.

ANNOUNCEMENT

THE ALGOMA STEEL CORPORATION, LIMITED, take pleasure in announcing to their customers and the Canadian trade that in accordance with the widespread desire throughout the Dominion that there should be obtained in Canada with Canadian labor, a much larger proportion of the requirements of this country in STEEL SECTIONS for STRUCTURAL PURPOSES, CAR CONSTRUCTION, SHIPBUILDERS' REQUIREMENTS, etc., they are just completing extensive alterations and additions to their rolling mills, and on or about 1ST NOVEMBER, will be ready to produce and ship American Standard Sections of BEAMS and CHANNELS up to and including 15", all standard sections of ANGLES from 6" x 6" down to 1¼" x 1¼", ZEE BARS for car builders and general purposes, small and large ROUNDS and SQUARES, and FLAT BARS up to 14" wide. The quality of the product is already well known to the trade, and is exclusively steel made by the Open Hearth process. and can be furnished in all grades from the softest rivet stock to high carbon special spring material.

MARK OF ALGOMA O.H. QUALITY

The following are the sections which will be rolled:---

ANGLES—Equal Leg—
6 x 6"—5 x 5"—4 x 4"
3½ x 3½"—3 x 3"
2½ x 2½"—2¼ x 2¼"
2 x 2"—1¾ x 1¾"
1½ x 1½"—1¼ x 1¼"

ANGLES—Unequal Leg—
6 x 4"—6 x 3½"—5 x 4"
5 x 3½"—5 x 3"—4½ x 3"
4 x 3½"—4 x 3"—3½ x 3"
3½ x 2½"—3 x 2½"—3 x 2"
2½ x 2"

BEAMS—
15", 12", 10", 8", 6", 5", 4", 3".

CHANNELS—
15", 13", 12", 10", 8", 6", 5", 4", 3".

ZEES—
3¼ x 5 x 3¼ x 5/16
3 5/16 x 5 1/16 x 3 5/16 x ⅜"
3⅜ x 5⅛ x 3⅜ x 7/16"
3 1/16 x 4 x 3 1/16 x ¼"
3⅛ x 4 1/16 x 3⅛ x 5/16"
3 3/16 x 4⅛ x 3 3/16 x ⅜"
2 11/16 x 3 x 2 11/16 x ¼"
2¾ x 3 1/16 x 2¾ x 5/16"

ROUNDS—
All sizes from ½" up to and including 4".

SQUARES—
All sizes from ½" up to and including 3".

FLATS—
All sizes from 1 x ¼" up to and including 14" wide.

MINE RAILS—
All sections from 12 lbs. up to and including 45 lbs. per yard.

PIG IRON—
Machine cast FOUNDRY MALLEABLE and BASIC.

SULPHATE OF AMMONIA.
NITRE CAKE.

For the better convenience of customers who may find it necessary to secure rush shipments of particular items, they contemplate keeping a large stock of all the various standard sections constantly on hand, and to this end extensive warehouse facilities are being prepared.
Your enquiries and business will be appreciated.

ALGOMA STEEL CORPORATION

SAULT STE. MARIE, ONTARIO

"Where There's a WILT—
There's the Way"

WILT

High Speed and Carbon TWIST DRILLS

Reamers and Milling Cutters

WILT Products are manufactured with the sole purpose of meeting the demand for an absolutely dependable tool of high quality.

WILT HIGH SPEED and CARBON TWIST DRILLS, REAMERS AND MILLING CUTTERS

are the kind of tools you can depend upon to give the highest form of service. If you are not getting the satisfaction you would like, adopt the **WILT** line. They have the quality that gives long and satisfactory service. **Give them a trial.**

Wilt Twist Drill Co. of Canada, Limited, Walkerville, Ontario

London Office; **Wilt Twist Drill Agency, Moorgate Hall, Finsbury Pavement, London, E.C. 2, England**

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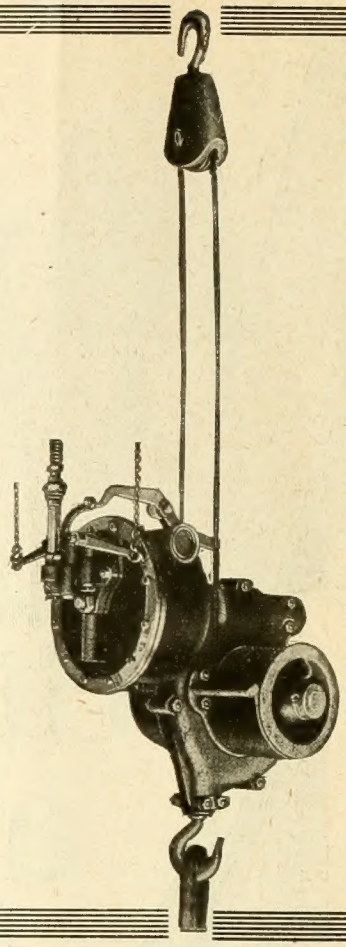
Less Overhead Expense

Whenever a strong, dependable hoist is needed, the "Imperial" air motor hoist fills the bill.

Few Parts Mean Less Trouble
The "Imperial" Has few Parts

The motor is completely balanced; the sensitive control allows the load to be raised or lowered a fraction of an inch at a time. Ball and roller bearings and thorough lubrication insure long wear.



Bulletin 8006 will interest you.

Canadian Ingersoll-Rand Company Limited

Sydney Sherbrooke Montreal Toronto Cobalt
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Swedish Steel & Importing Co., Limited

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Direct representatives of foremost Swedish mills: makers of

Tool Steels

ALLOY STEELS, BILLETS, BARS, DISCS, SHEETS, HIGH SPEED STEELS, DRILL RODS, DRAWN BARS, SEAMLESS TUBING, COLD ROLLED STRIP STEEL, WELDING WIRE, WROUGHT AND ROLLED IRON, PIG IRON, STEEL AND IRON ENDS, HOLLOW AND SOLID MINING DRILL STEEL.

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PROMPT SHIPMENTS from large stock

Electrite

Electric furnaces, automatically regulated, the most modern methods, and the introduction of Uranium — make this a steel of truly remarkable cutting properties.

We know "Electrite" cannot be bettered — and stand ready to prove it to you.

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LATROBE, PA.

High Speed Steel

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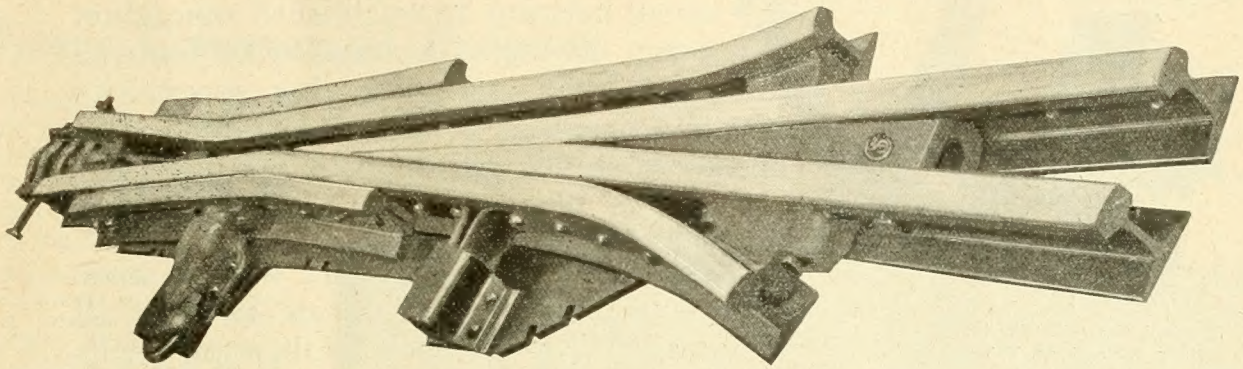
TRACKWORK

For Steam and Electric Railways



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Mates Diamonds
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Steel Castings

High Grade STEEL Castings
Of Every Description

Prompt Deliveries

Send us your drawings for estimates.

THE ELECTRIC STEEL AND METALS COMPANY, LIMITED
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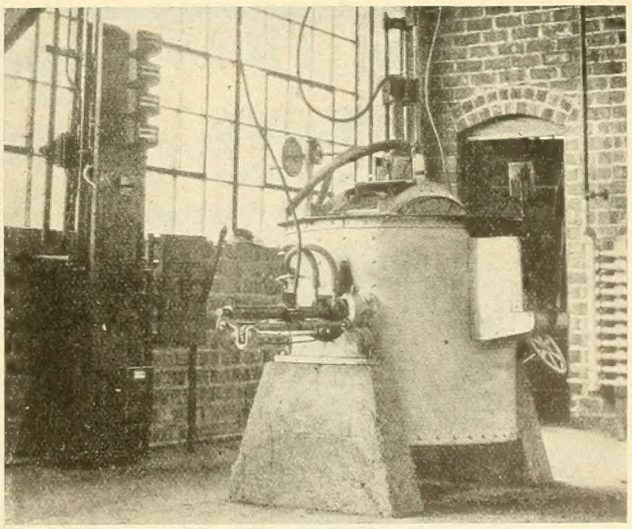

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Built in capacities from 100 lbs. to 6 gross tons

Melting and Refining Steel, Cast Iron, Ferro-Manganese, Copper, Nickel, Aluinum and various Non-ferrous Alloys.

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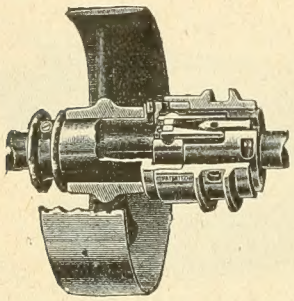
THE JOHNSON FRICTION CLUTCH



Standard Single Clutch with Pully Mounted on Hub —Clutch Engaged.

MANUFACTURERS who are particular about keeping an established reputation equip all their machines with Johnson clutches. They recognize that superiority must be consistent in order to count. And Johnson clutches assure them of uniformly good service wherever they are installed.

Other clutches might work well in some cases—but Johnson clutches are *sure* for all purposes. We study each application on its own conditions, and build a clutch that is just right for the job.

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The Babbitt Metal that's at the Front in Efficiency and Economy

Order a Box from our nearest Factory

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HIGH SPEED STEEL

INTRA STEEL GIBRALTAR STEEL

Tool Steel for Every Purpose

Swedish Lancashire Iron

Twist Drills, Taps, Hack Saw Blades, Milling Cutters
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If what you need is not advertised, consult our Buyers' Directory and write advertisers listed under proper heading.

STEEL *for*

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We are the only company in Canada producing steel ingots by the "HARMET" Liquid Process, a process that makes these ingots vastly superior to the ordinary kind, improving the physical properties and reducing the waste of ingot.

We can supply forgings of all shapes and sizes made of ordinary or "HARMET" Fluid Compressed Open-Hearth Steel on the Shortest Notice.

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Steel Ingots
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Victoria FOUNDRY & MALLEABLE

Made by The Canadian Furnace Co.
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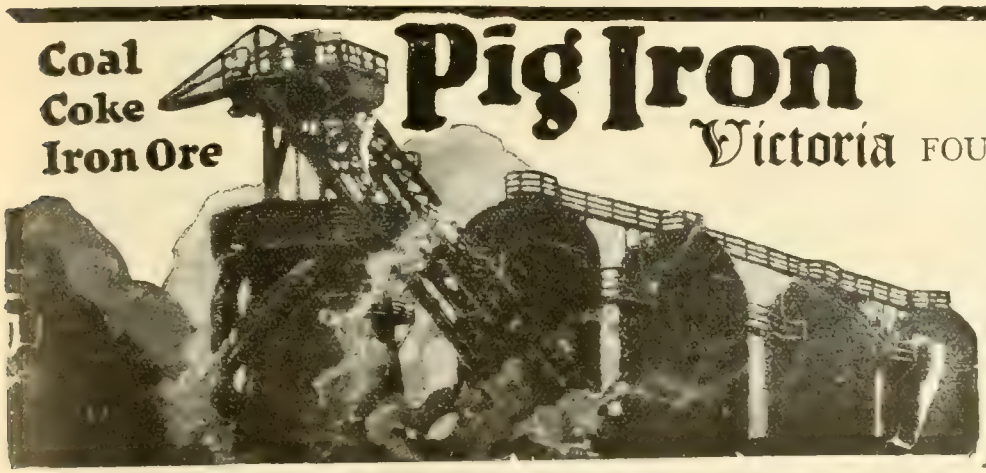

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Insures Maximum Production

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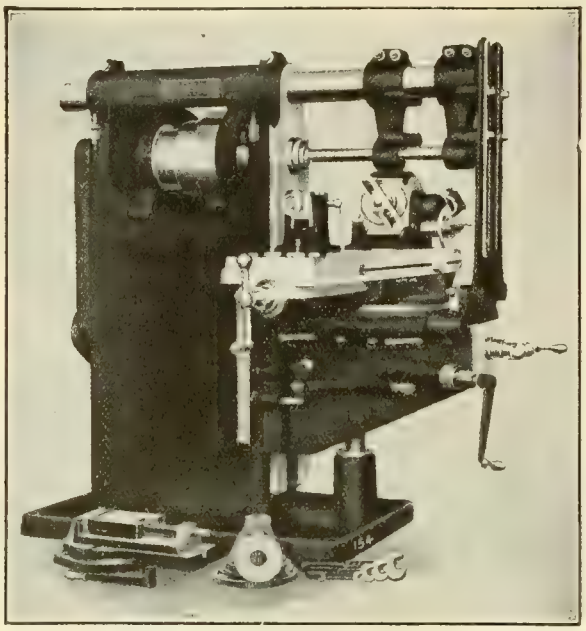

No. 2 Full Universal and Attachments

Ford-Smith No. 2 Universal

The Miller of high-grade construction---fast, accurate, and durable.

FORD-SMITH MILLERS

Immediate Delivery

No. 2 Plain
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No. 3 Universal

A Ford-Smith Miller is made for every requirement

THE FORD-SMITH MACHINE CO., Limited
HAMILTON, CANADA

WINNER
of the
LONG SERVICE
MEDAL
For Bearings in
High-Speed,
Heavy-Duty
Machinery

Manufactured by
Hoyt Metal Company
FACTORIES:
TORONTO
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THE
TRADE K–T MARK
FOUNDRY
GALT - ONT.

Do Your Castings Cost Too Much?

A rearrangement of your patterns might cut their cost 25%; a different method of molding them might double your production at no increase in molding cost. We can advise you and we have expert metal and wood pattern-makers who are able to make any changes that may commend themselves to you.

If you need some new Patterns

send us a sample, blueprint or sketch, and ask for our advice. It won't cost you anything. If our advice is good and commends itself to you, it is only fair to assume that our work will be equally satisfactory, and we need the work as badly as you need the patterns.
We are in a position to do turning, boring, drilling or other semi-finishing operations on castings supplied by us.

ASK US

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3 Minutes to Drill 20 Holes

That makes a total of 20 Cylinder Blocks (400 holes) drilled every hour. We really should say "Multi-Drilled," for that is why this output is possible.

A Motor Driven NATCO is doing it in the plant of the Harroun Motor Car Company, Detroit—and thereby making the day 20 times as productive; the entire 20 holes are drilled at the same time. One hole at a time method would not only take 20 times as long, but would require 20 men and 20 machines.

As many as 72 holes, of various sizes, can be drilled, tapped, reamed, spotfaced or counterbored at the same time. The NATCO patented feature—Independent Change of Speed for each Drill—provides the approximate correct speed for each size tool.

Shall we give you production estimates on your work?
Simply send us blueprints.

We also design and build jigs and fixtures for use in connection with NATCO Multi-Drillers.

The National Automatic Tool Company
Richmond, Indiana, U.S.A.

List of NATCO Foreign Agents

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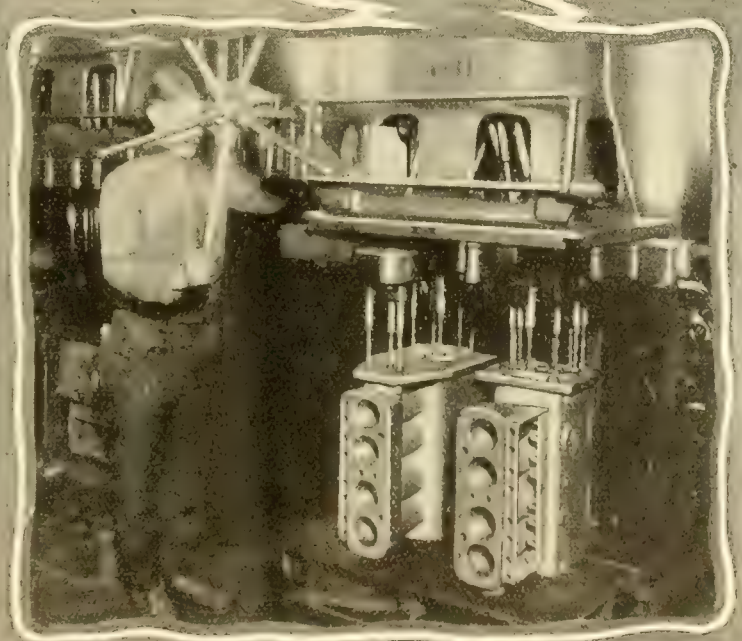
E. Isbecque & Co., Belgium.
Allied Machinery Co. of America, Italy Spain, Portugal and Switzerland.
Aux Forges de Vulcain, France.



UNIVERSALLY ADJUSTABLE NATCO MULTIPLE DRILLS

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THE HIGH SPEED STEEL

MARSHALL, SON & BUNNEY
39 Richmond Street East TORONTO, ONT.

SOLE CANADIAN AGENTS FOR
WM. ATKINS & CO., LIMITED
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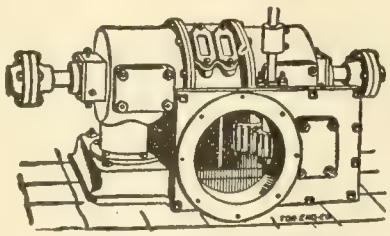
ALL SIZES
IN STOCK

WATER POWER DEVELOPMENT



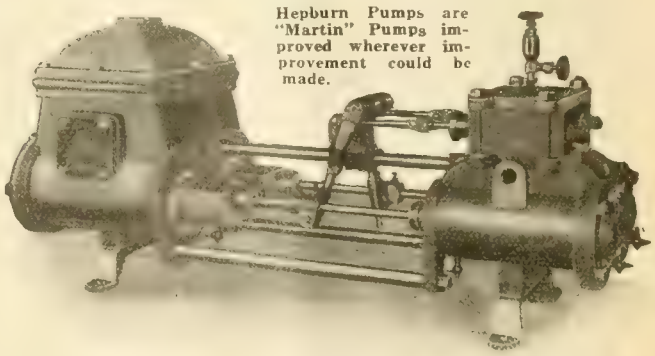
Over forty years' experience in designing and installing special turbines, both on vertical and horizontal shafts.
Can supply complete equipment, including flume, turbine and power transmission.
Stock of standard vertical shaft Little Giant Turbines on hand for prompt shipment.

We solicit your inquiries.

THE J. C. WILSON MFG. CO.
LIMITED
BELLEVILLE, ONTARIO

Hepburn Pumping Machinery

Our line embraces standard duplex pumps for boiler feeding and for fire and general service; tank or low service duplex pumps; duplex hydraulic pumps for service in connection with hydraulic lifts and presses, accumulators and oil presses; pressure or mine pumps; horizontal power pumps and air and circulating pumps, etc.



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18-60 Van Horne Street Toronto, Ontario

CANADA
FOUNDRIES & FORGINGS
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ENDURANCE TOOLS
NEVER WEAR OUT

PIPE THE WRENCH—WRENCH THE PIPE

Canadian Billings & Spencer Plant
Welland, Ont.

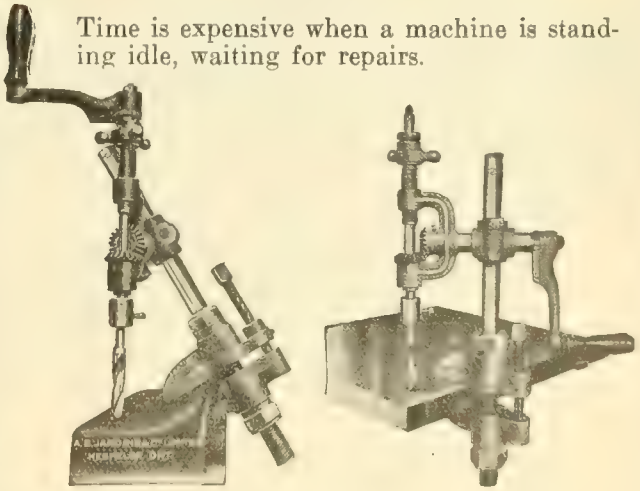
Crucible
AND
Open Hearth Steel
Tool Steel
"ARGO" BRAND *HIGH-SPEED* STEEL

The John Illingworth Steel Co.
1856
Frankford, Phila.
New York Office 217 Broadway

RALPH B. NORTON, AGENT
Montreal, Canada

Jardine Universal Ratchet Drill

Time is expensive when a machine is standing idle, waiting for repairs.



On the average repair job, this machine completes the drilling in less than the time required to set an ordinary ratchet to begin.

Weight, 40 lbs. Price, $26.50 net
Sold by all Machinery and Supply Houses

A. B. JARDINE & CO., Limited
HESPELER, ONTARIO

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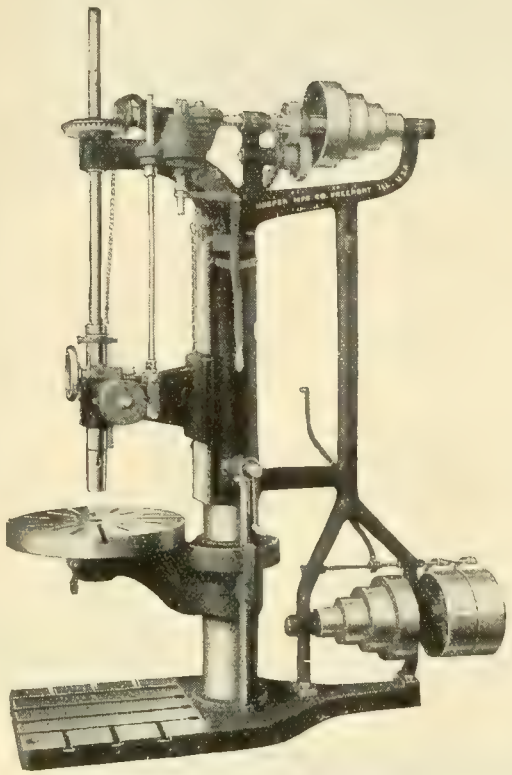
The Driller for Exact Work



HOEFER

Enable Your Workmen to Eliminate Spoilage

The Hoefer Driller is pre-eminently the one to be found in the best plants. "It's almost as good as a Hoefer," so often heard in the machine and tool trade, indicates the position held by Hoefer Drillers.

Exact drilling, to the last thousandth of an inch, pays by eliminating spoiled material. Hoefer Drillers pay for themselves and increase the workman's pride in his work.

Twenty-five Years on Market

Twenty-five years making drillers has given Hoefer the "Know-how." The Hoefer Drillers are used by many of America's leading manufacturers. Equip your factory the Hoefer way. Take any kind of a drilling problem you have to the Hoefer Manufacturing Company, and the Company's experts can tell you how it was solved by other men, some of whom you may know.

Investigate now. Write to-day for catalog. The Hoefer engineers are at your service.

HOEFER MFG. CO.
FREEPORT, ILL.

MacKINNON STEEL CO., LTD.

Engineers, Manufacturers and Erectors of Steel Structures

Industrial Bridges, Buildings, Towers, Smoke Flues and Stacks, Chutes, Coal Bins, Ore Bins, Tanks, Cranes, Engine Houses, Grain Elevators, Derricks.

Structural Steel and Steel Plate Work, and a combination of the two lines.

Prompt Deliveries Assured.

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Sizes 180, 160, 140, 120, 110, 100, 90, 80, 70, 60, 54, 46 40, 36, 30, 24, 20, 18, 16, 14, 12, 10, 9, 8. hole.

EMERY FLOUR AND WASHED FLOUR

EMERY GLASS FLINT GARNET CORUNDUM CARBORUNDUM	PAPER AND CLOTH	IN SHEETS, ROLLS DISCS, BANDS, STRIPS and TAPES, &c.

John Oakey & Sons

LIMITED
WELLINGTON MILLS
LONDON, S. E. 1., ENGLAND

Production Milling
on the
Potter & Johnston
Automatic Milling Machine

Here is just one of the many pieces that can be produced to advantage on the Potter & Johnston Automatic Milling Machine.

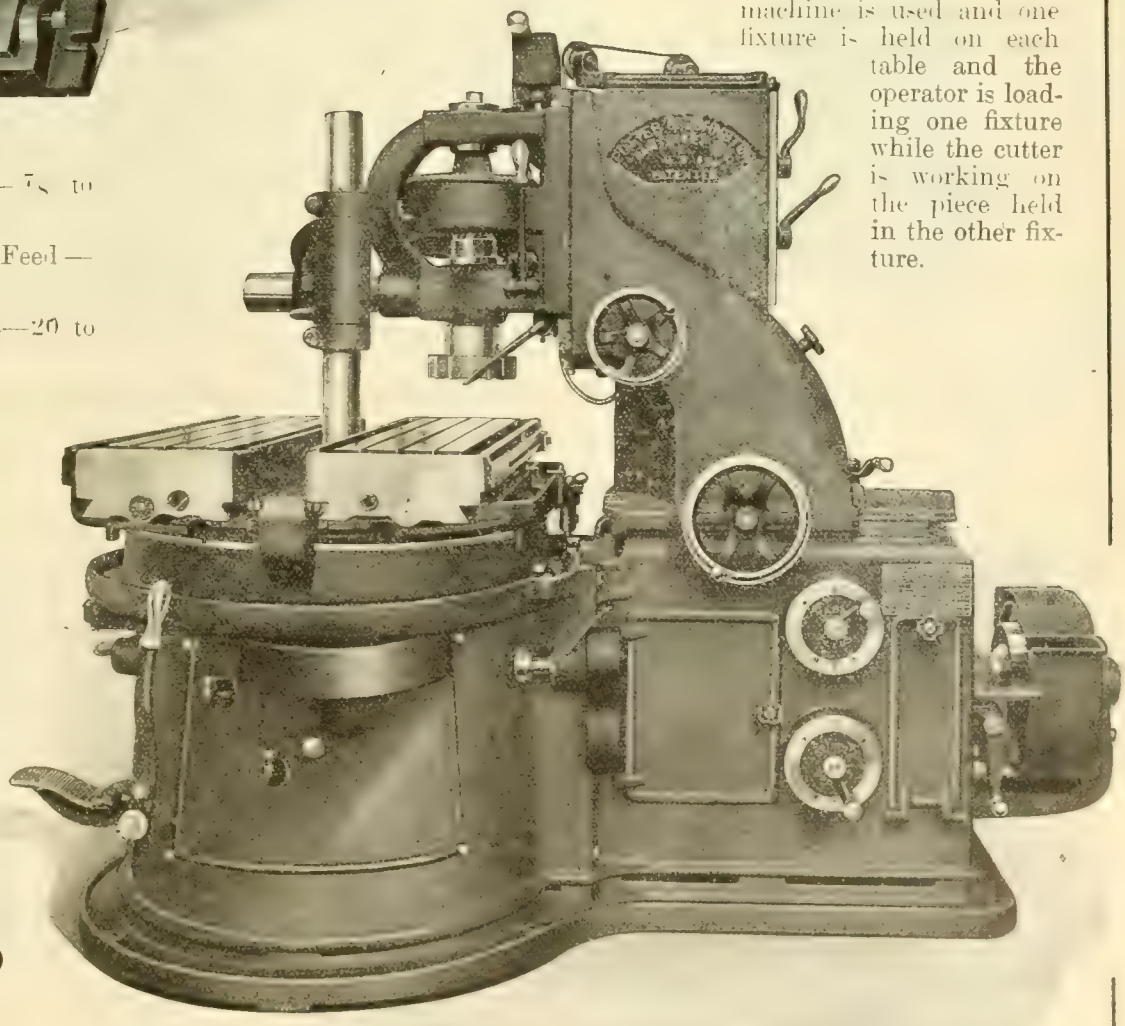
In this case the vertical machine is used and one fixture is held on each table and the operator is loading one fixture while the cutter is working on the piece held in the other fixture.

16 Table Feeds — 7⅛ to 12 5-16 inches.

Length of Table Feed — 29 inches.

16 Spindle Speeds—20 to 180 R.P.M.

Estimates cheerfully furnished upon receipt of your blue prints or samples.



Bulletin 40

Canadian Offices: POTTER & JOHNSTON MACHINE CO.

ROELOFSON MACHINE & TOOL CO., LIMITED

Head Office: 1501 Royal Bank Building, Toronto, Canada.
Works and Warehouse: Galt, Ont., Canada.

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"The Marshalltown Throatless Shears"

guarantees perfect work at less than half the ordinary expense.

Rotary, self-feeding shears designed for cutting in and out curves, straight or irregular shearing, circles, also beveling and splitting of plates. Built in various sizes having capacities from tin up to ½" thick. No limit to the size of sheet being cut. Hand, belt or motor drives. The last word in metal cutting shears. We also manufacture Rotary Bevel Shears, Splitting Shears and Plate Milling Machines.

Let us know your requirements.

Marshalltown Mfg. Co.
Marshalltown, Iowa
U. S. A.

If You Want Production--

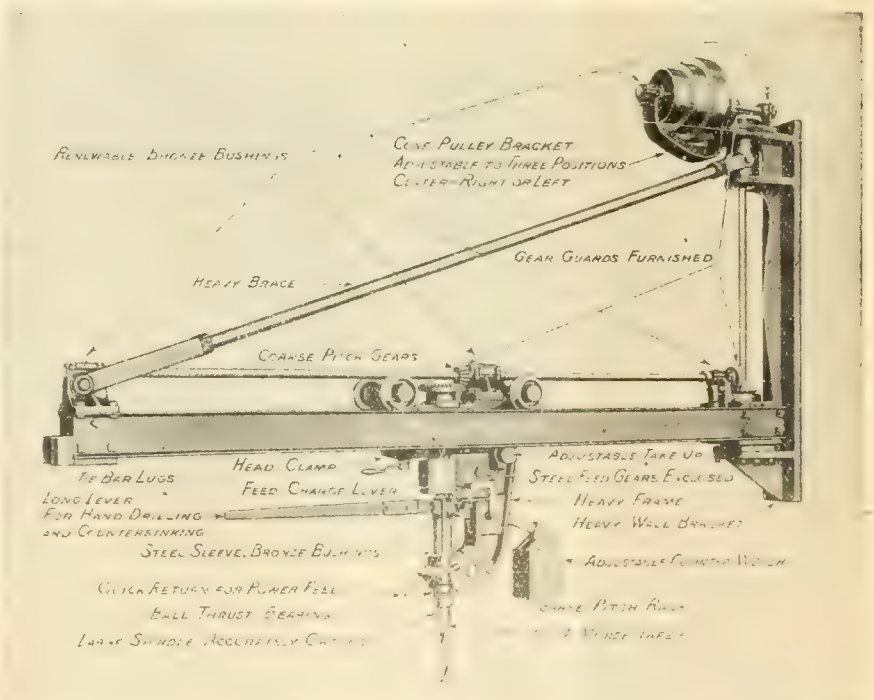
You can't do better than install this Wall Radial Drill in your plant. We'll say you won't have it in operation more than a month before you will begin to congratulate yourself on your judgment in adding this machine to your equipment. Materials and workmanship that you can depend upon to the limit are features of the construction, and our bulletin will give full details.

GET IT TO-DAY!

MADE IN FOUR STANDARD SIZES.

Rated size	Drills to centre of	Wall to end of arm
7 ft.	14 ft. circle	10 ft.
9 ft.	18 ft. circle	12 ft.
11 ft.	22 ft. circle	14 ft.
13 ft.	26 ft. circle	16 ft.

F.O.B. Boston, Mass.



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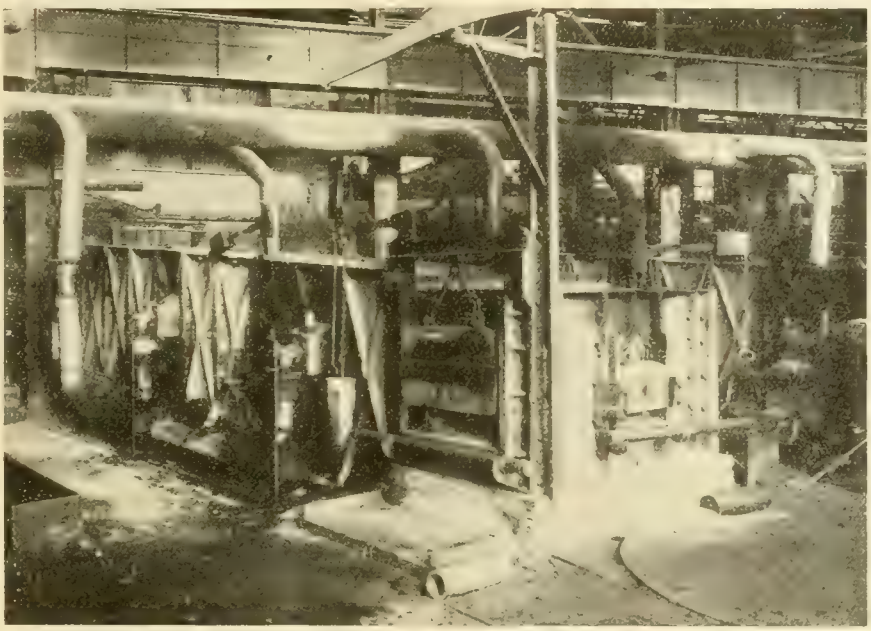
Another MECOL Furnace

demonstrated its superior features point by point to a group of men whose years of experience in the heat-treatment of metals made them appreciative judges. We refer to the "Mecol" Furnace shown in this illustration, installed at the Pointe St. Charles Works of the Canadian Steel Foundries, Limited.



Our intimate knowledge of heat-treating methods, and our long experience in the building of efficient furnaces fit us to give helpful advice—and that we will do promptly if you

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Mechanical Engineering
Company, Limited
Room 308, Bank of Toronto Bldg., Montreal
Three Rivers, Quebec, Canada

Whitcomb-Blaisdell Planers

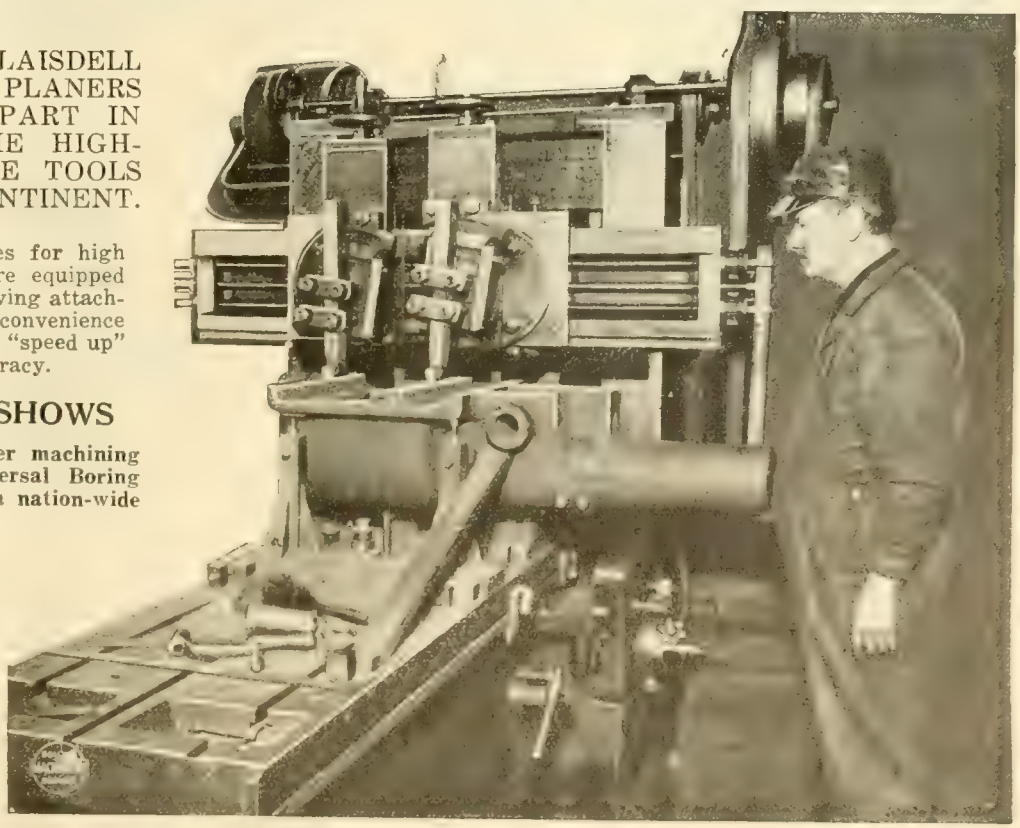
WHITCOMB-BLAISDELL LATHES AND PLANERS PLAY SOME PART IN THE MOST OF THE HIGH-GRADE MACHINE TOOLS MADE ON THE CONTINENT.

ALL-ROUND machines for high grade work, they are equipped with special labor-saving attachments that add to their convenience and enable the operator to "speed up" without endangering accuracy.

ILLUSTRATION SHOWS

a Whitcomb-Blaisdell Planer machining the head post of a Universal Boring Machine—a machine with a nation-wide reputation for accuracy.

May we send you our catalogue giving full particulars?



Whitcomb-Blaisdell Machine Tool Co.

WORCESTER, MASS. U.S.A.

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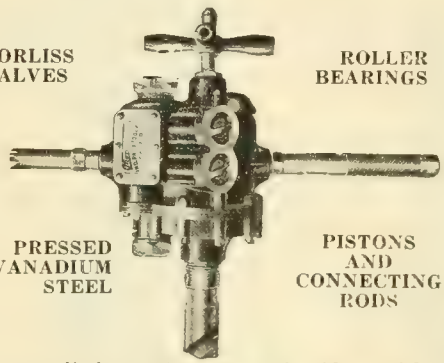
PNEUMATIC TOOLS

Thor

ELECTRIC DRILLS

AIR DRILLS



Four cylinders — two on each side — with Semi-Corliss Valve close to each pair, giving greater power and efficiency.

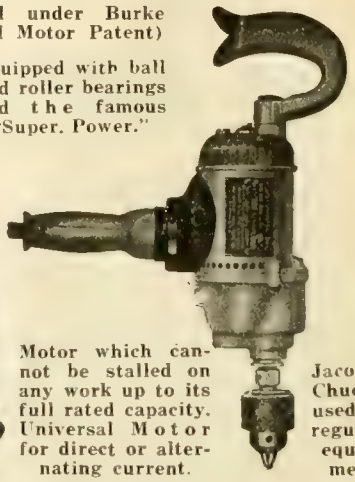
ALL RECORDS BROKEN FOR SPEED, POWER and ENDURANCE

CHIPPING HAMMERS

4 Sizes, 1 in. to 5 in.
All parts hardened and ground.

(Licensed under Burke Universal Motor Patent)

Equipped with ball and roller bearings and the famous "Super. Power."



Motor which cannot be stalled on any work up to its full rated capacity. Universal Motor for direct or alternating current.

Jacob's Chucks used as regular equipment.

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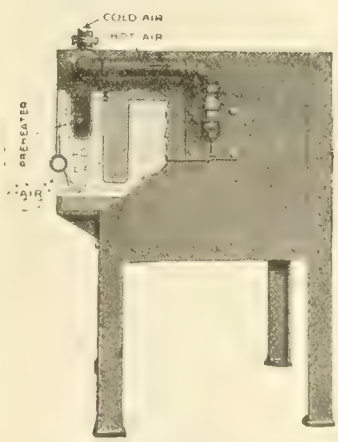

Showing deflection of hot gases, with induced air *toward* the furnace, and the preheating of air for combustion.

It is economical in fuel, air and power; protects workmen from flame and hot gases and the heated material from oxidation or scale; increases the quantity and improves the quality of heated products; prevents smoke, flame and heat escaping into the forge shop.

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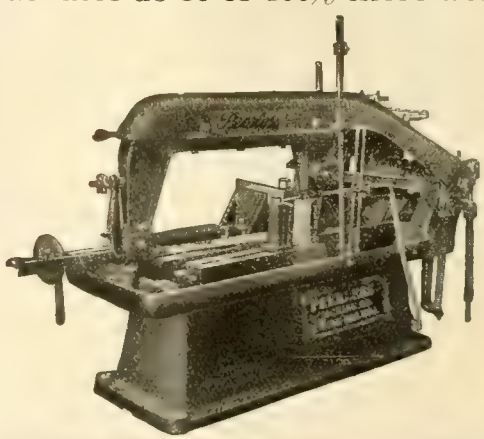
"FURNACE AND FUEL TO SUIT ALL WORK"

Would you like to have us prove that

Peerless HIGH SPEED

Machines do 50 to 100% more work



The Peerless has established a new standard of production in so many plants that we are ready to ship one at our expense and risk, if you agree to give it a thorough test. A trial like this often results in our selling from 1 to 10 machines.

The Balance Lift of the Peerless

automatically raises the blade for the return stroke. This greatly prolongs the life of the blades, economizes power, and increases production. There are more good features which we shall be glad to acquaint you with.

The Peerless assures you the peak of production at very lowest cost. Write for full details.

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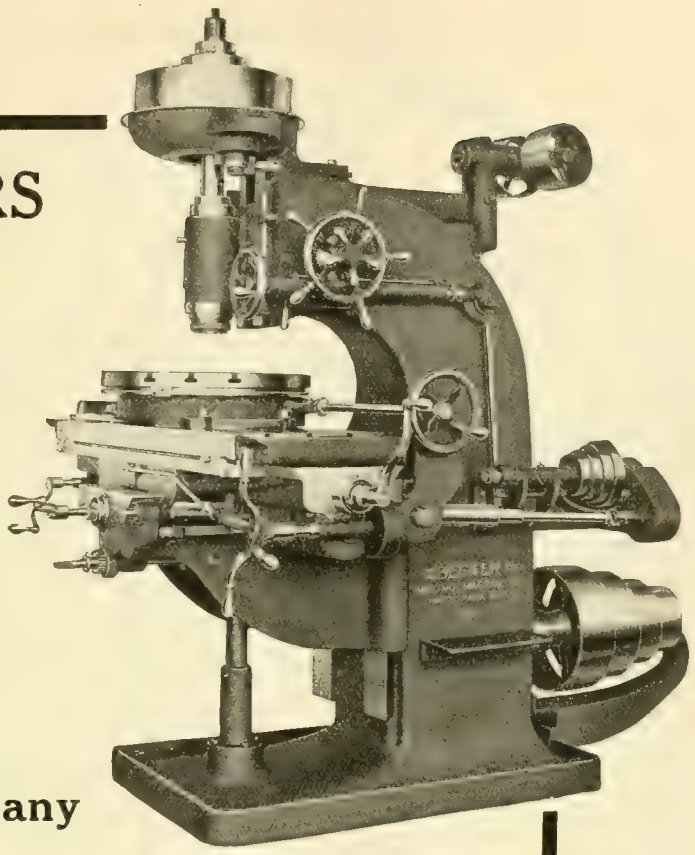
BECKER BELT-DRIVEN MILLERS

for

GREATER PRODUCTION because they work continuously—every hour of operation is a production hour—

ECONOMY OF OPERATION because they are power savers; the internal belt drive forms an elastic drive to the spindle that prolongs the life of the cutter by eliminating chatter and vibration.

ACCURACY because the machines have exceptionally fine feeds and are equipped with micrometer dials and stop gauges. The Patent Becker Gibbing keeps the work permanently aligned with the spindle.



Becker Milling Machine Company

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It doesn't make a bit of difference whether it's threading screws or tapping axle housings, there's a NAMCO Threading Tool for every thread cutting requirement.

NAMCO Dies and Taps are simple in design, rigid in construction to cut threads true to specification on all classes of work.

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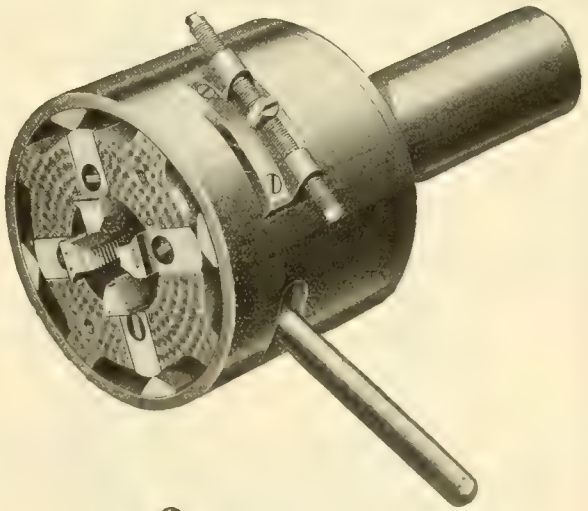

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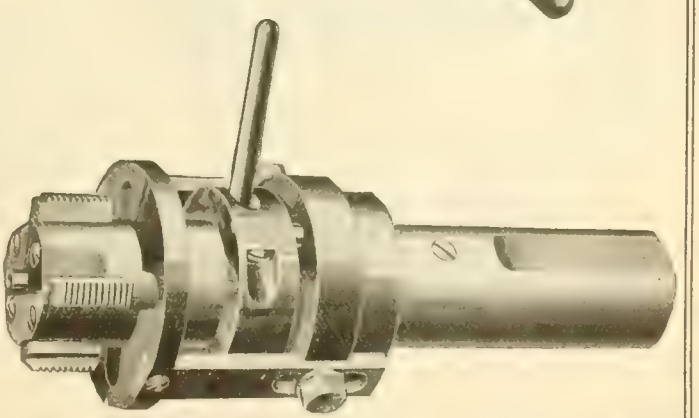

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with
THE "RACINE"
Speediest of All
Metal Cutters

DO you know that the "RACINE" High Speed Cutting Machine has a patented feature that lifts it above any other metal cutter made?. This is the patented Automatic Lifting Device, which automatically lifts the blade on the return stroke, preventing all dragging and strain on the non-cutting stroke. **The result is speedier cutting with less power and a big saving in blades.**

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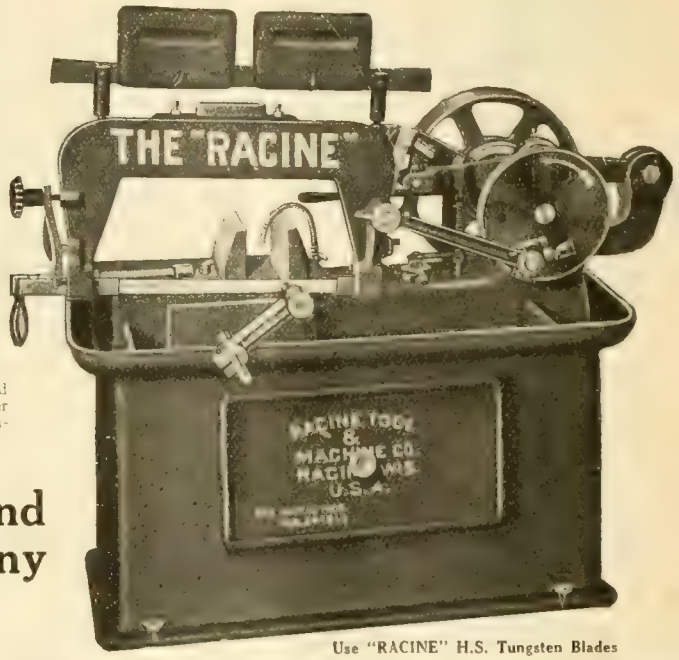

THE "RACINE" machine and "RACINE" H.S. Tungsten Power Blades make an efficient and economical combination—use both.

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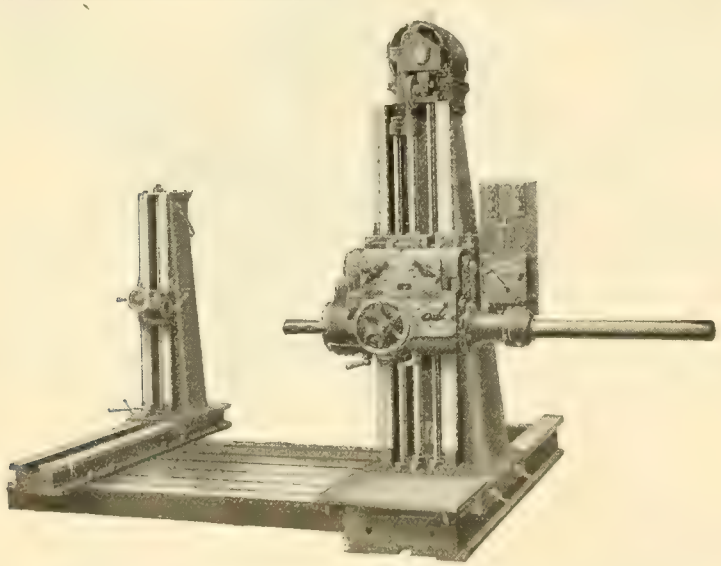
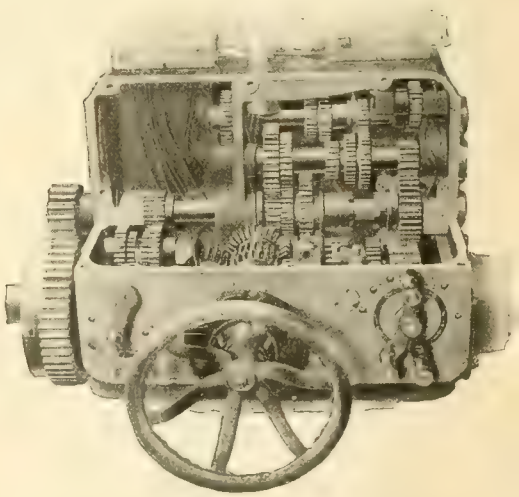




View of saddle with cover removed

Saddle of Improved Box Type Construction

In the Landis Boring Machine the saddle consists of two heavy castings, the body and cover, machined to a right-angle fit and tightly joined.

A train of feed change gears, with the cover form one unit, and the speed gears and spindle, with the body, complete the other.

All operating levers are so placed that they may be reached by the operator from one position. All hand feeding is manipulated through one hand wheel. The feeding of the spindle in either direction is caused by a differential speed between the feed nut and the spindle.

These improvements are but a few of the Landis features which make this boring machine so efficient.

LANDIS TOOL COMPANY
WAYNESBORO, PA.
New York City—50 Church Street

Smalley General
No. 1 Flange Thread Miller

Sturdy
Powerful
Accurate

Mills Flange Threads With Fewer Rejects Than Any Other Miller.

SHORTER hours and higher wages are demanded by workmen. This means increased production costs. How are you meeting the situation? By putting up the price of your products? There is another and more satisfactory method! It is found in giving your workmen improved tools to operate with—tools that are capable of turning out more work per hour.

The Smalley-General No. 1 Flange Thread Miller is sturdy, accurate and fast.

It is so simple in design that an ordinary mechanic can turn out more work in eight hours than is possible by any other method of thread cutting in ten hours.

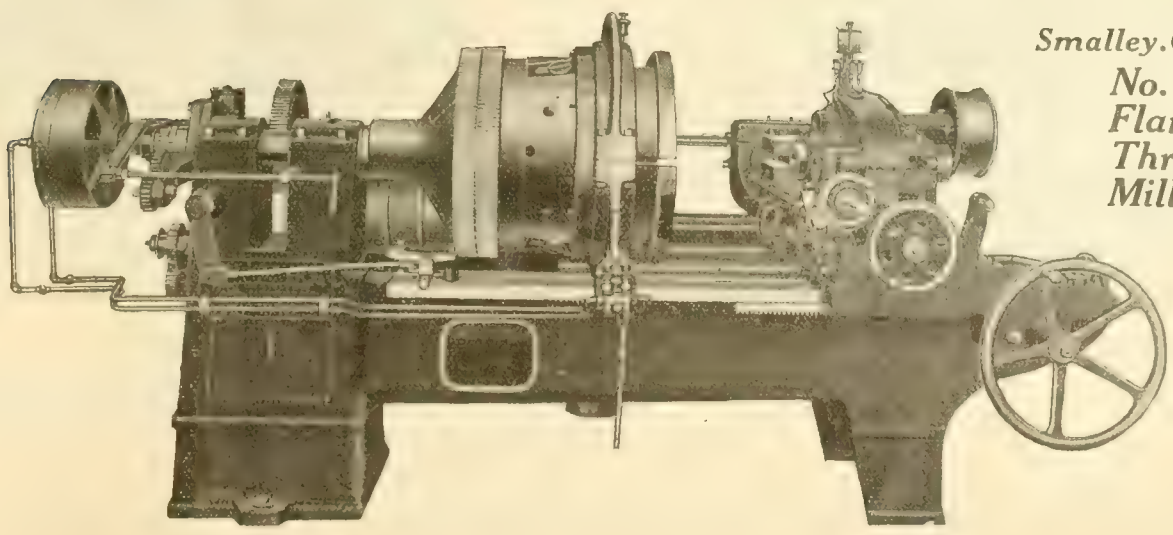
It is the most efficient tool of its kind and because of its several exclusive features will mill flange threads with fewer rejects and at a lower cost.

The same outstanding principle which applies to all **Smalley-General Thread Millers** applies to the **No. 1 Flange Thread Miller.** While the work held in the chuck makes one revolution, the milling head is moved back on the ways, a distance amounting to the pitch of the thread to be milled, and when a multiple tooth hob is used, the thread is complete at ONE revolution of the work.

There are many other points in the construction of this tool you would be interested to know about. **May we send you a complete description of the machine?**

SMALLEY-GENERAL CO., Inc.
BAY CITY, MICH.

Canadian Agents: Rudel-Belnap Co., Ltd., Montreal and Toronto



Smalley.General
No. 1
Flange
Thread
Miller

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Up To Twenty Tons

THAT is the capacity of the Hisco plant, and Hisco Steel Castings represent the highest possible standard of quality—whether the weight be in pounds or tons. Every heat of steel that is poured has behind it a laboratory test.

There is no element of chance in "Hisco" products, every process that enters into the production must count upon the final factor of responsibility.

The "Hisco" plant is equipped to produce any definite grade of steel casting in any alloy or process from one pound to twenty tons.

Machine Moulded Gears

in sizes up to 18 ft. without patterns.

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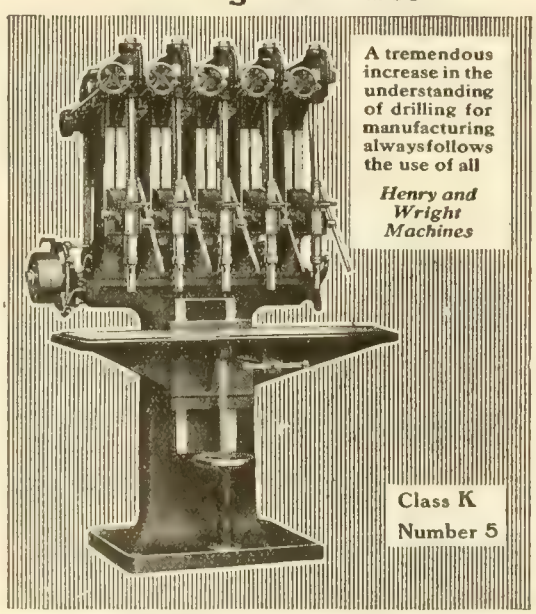
HULL, CANADA

HENRY & WRIGHT
Drilling Machines


A tremendous increase in the understanding of drilling for manufacturing alwaysfollows the use of all
Henry and Wright Machines
Class K
Number 5

The Henry & Wright Mfg. Co.
Hartford, Conn.

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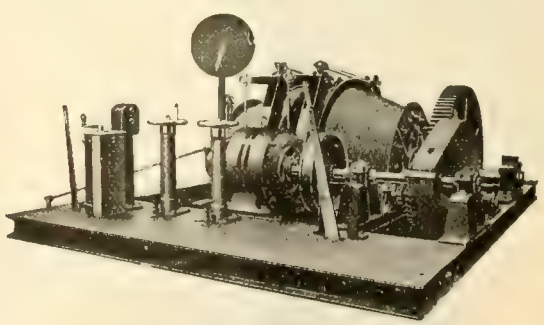

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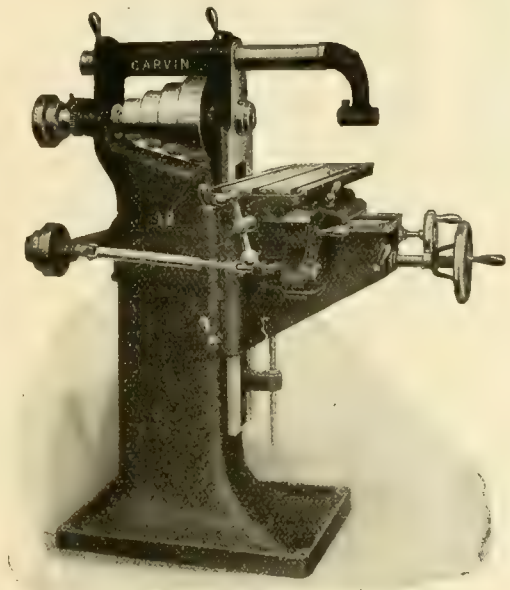

No. 12—Plain Milling Machine—Use Code Abrade

No.12 PLAIN MILLING MACHINE
ALL LIGHT MANUFACTURING

This machine is built especially strong and substantial for a tool of its capacity, and has many valuable features worthy of special mention. The slide is fitted with a quick pitch screw, giving one inch per turn. This combines the rigidity of a rack feed with the steadiness of the screw feed. The table has an oil pan all around it, with finished edges—automatic feed, trip and reverse—adjustable nut on the feed screw to take wear—the Feed Screw is hardened.

Adjustments ..... 18 x 6 x 15 in.

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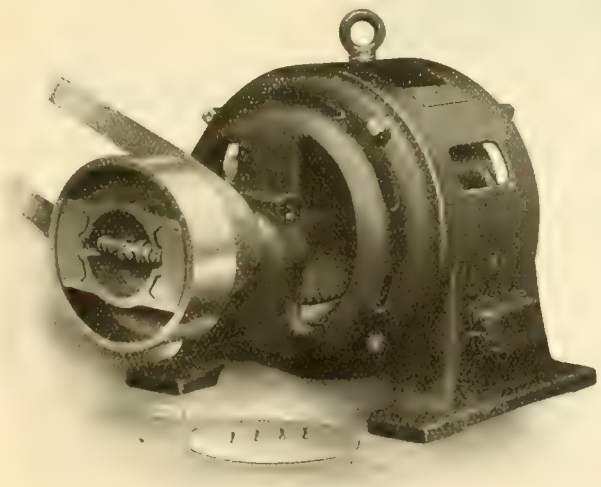
½ H.P. to 1500 H.P.



No Motor Should be Without This Simple and Unique Device.

Entirely Dispenses With all Starting Difficulties

The Clutch also Effects a Great Saving in Current Consumption and Reduces the Initial Cost of Motor and Switchgear.

Please Mention Speed and H.P. of Motor When Sending Enquiries and State the Current Supply.

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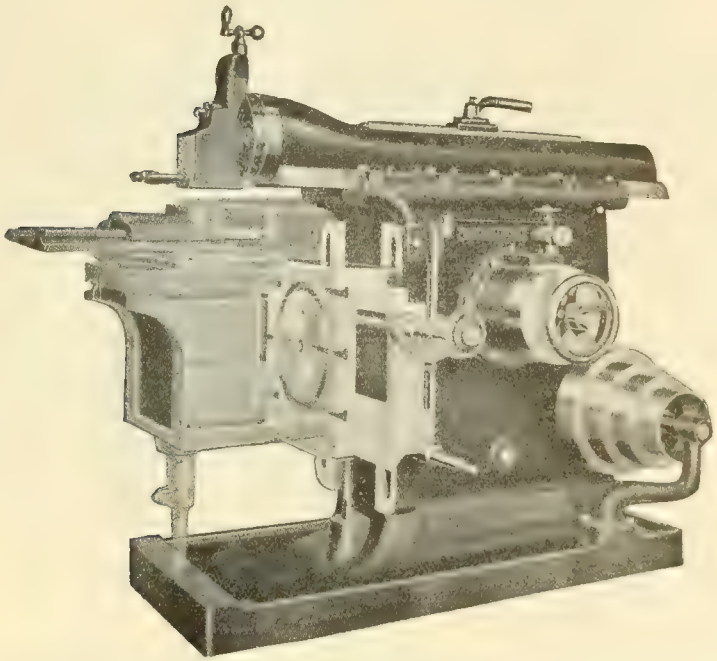

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Built in three sizes: 16 inch, 20 inch and 24 inch.

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Milwaukee, Wisconsin

Announcing—

WILLIAMS' "Vulcan" Forged-Cutter Tool Holders give unequalled service to those who prefer the solid, forged-type of cutting tool. Each Holder, by the mere insertion of small High Speed Forged-Cutters is adapted to the heaviest service on Lathe, Planer, etc.

The economy and convenience of this line, when installed as standard shop equipment, is at once apparent, as all blacksmith work, to say nothing of the very considerable investment necessitated by heavy, solid forged-tools of costly High Speed Steel, is eliminated.

Absolutely simple in construction, yet possessing all the advantages of the solid tool without its expense.

Cutters, drop-forged from the finest grade of High Speed Steel, in stock in a great variety of sizes and types, finished and hardened ready for use. Ask for descriptive booklet.

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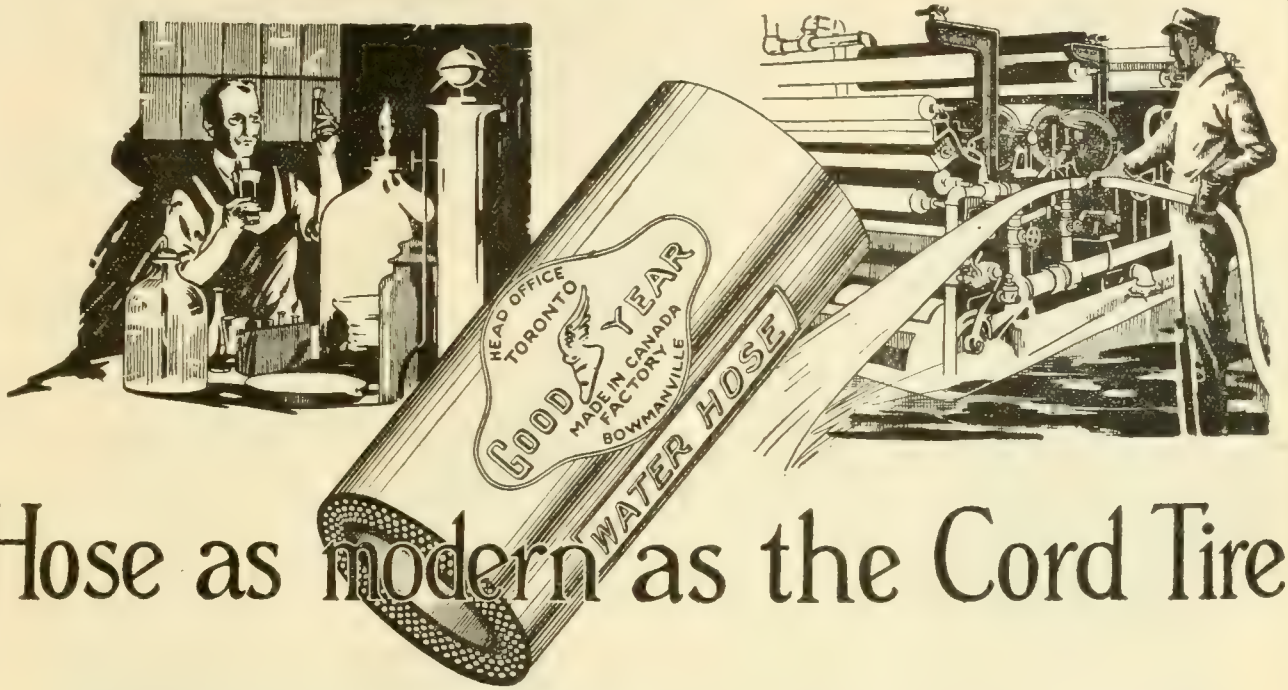
Williams' "Vulcan" Forged-Cutter Tool Holders



Hose as modern as the Cord Tire

Go back to the days before Goodyear undertook to produce better hose, and you will find that rubber hose was built in much the same way that most hose is to-day.

An old-fashioned product. Good enough for those times, perhaps, but inadequate to meet modern standards of efficiency.

Goodyear opened a new era in the industry. Goodyear disregarded tradition. Goodyear's engineers started from the ground up to build hose of modern efficiency to meet modern needs.

The inevitable result of such methods was the development of better materials and improved hose construction.

Old ideas and old methods were forgotten. Goodyear Hose was built as if hose had never been built before. Modern industry's hose needs was the standard built to.

Is it any wonder, then, that the quality of Goodyear Industrial Hose dominates as does the quality of Goodyear Cord Tires?

Is it any wonder that Goodyear Hose gives longer, more satisfactory service and costs less in the end?

Goodyear builds a particular hose for every industrial purpose—water, steam, pneumatic tool, air drill, railway, fire, suction, and so on.

Let a man trained by Goodyear study your hose problem. Phone, wire or write the nearest branch.

The Goodyear Tire & Rubber Company of Canada, Limited

Halifax, St. John, Quebec, Montreal, Ottawa, Toronto, Hamilton, London, Winnipeg, Regina, Calgary, Edmonton, Vancouver.

GOODYEAR
MADE IN CANADA

INDUSTRIAL HOSE

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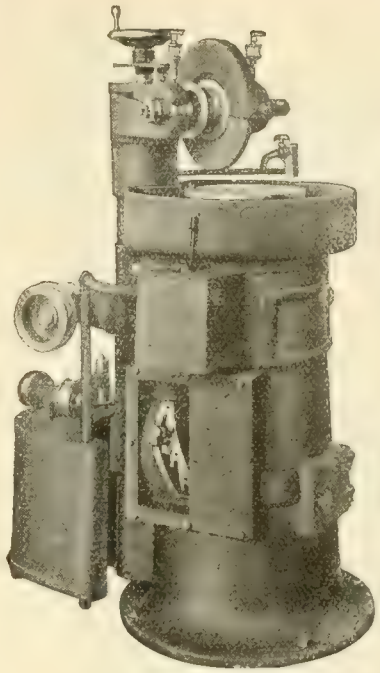

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Bristol 12-inch Rotary Precision Surface Grinder

Built for rapid production on grinding work.
It handles work either singly or in multiples within the capacity of the chuck and not thicker than 6-in., and grinds within quarter thousand in. of manufacturing accuracy.
And it is built to last.
It is provided with exceptionally long bearings throughout, especially in the back column. This prevents the wear, which is very slight, from affecting the accuracy of the grinder. The Back Column is made to swivel four degrees, which allows concave or convex grinding.
Bristol Rotary Surface Grinders are made in several types and sizes and are regularly equipped with 8-in., 12-in., and 16-in. magnetic chucks, either belt or motor driven and for dry or wet grinding.
Our Bulletin describes the many good points fully. Send us your name and address and we'll gladly mail you one.

Grinds within .0004 in. of absolute Accuracy

BRISTOL MACHINE TOOL CO.
SUCCESSORS TO C. G. GARRIGUS MACH. CO.
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BARNES DRILLS

Complete line. 8-inch to 50-inch swing

Gang Drills.—Horizontal Drills.

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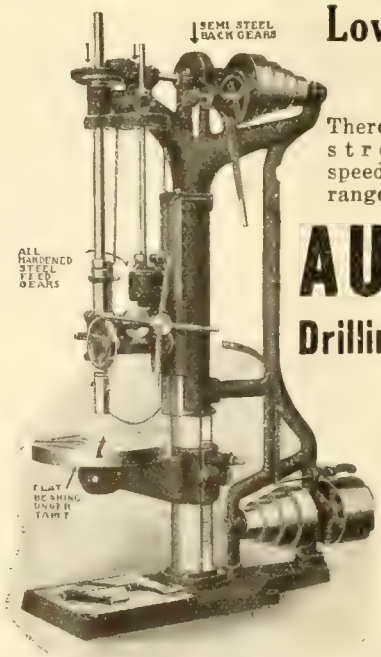


There is unusual strength, accuracy, speed, convenience and range in

AURORA

Drilling Machines

You can use them to great advantage on any work in your shop that's suitable for a machine tool of this kind. The operating is easy and the labor cost comparatively low.

Drop a line for full particulars and specifications.
Stationary Head Sizes 20"—21"
Sliding Head Sizes 22"—44"

The Aurora Tool Works

AURORA, INDIANA, U.S.A.

Wherever Pipe is Cut or Threaded Economically

The probability is two to one that it's a

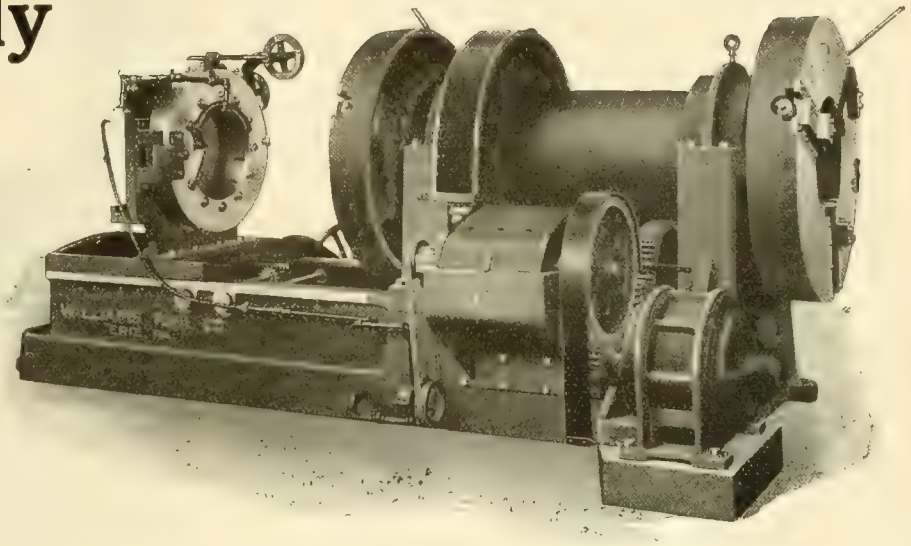
Williams Pipe Machine

that's on the job.

For in approximately two-thirds of all the larger plants in this country Williams' Pipe Machines are used.

It was the Williams Pipe Machine that brought highest honors home from the Panama Exposition.

The Machine illustrated has a capacity of 21½" to 12". Also nine other sizes to meet your requirements.



Write

Williams Tool Company

Erie - Penn. - U.S.A.

Canadian Agents: The A. R. Williams Machinery Co., Limited, Toronto, Canada

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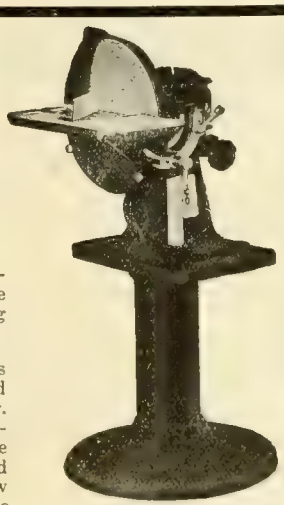
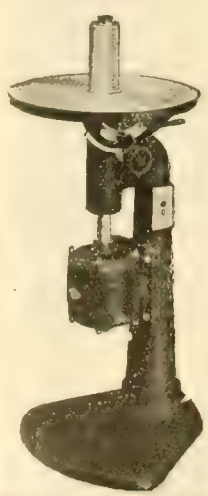
The Canadian Disc Sander is 90% Dustless



Think what a godsend that is to the pattern shop! Hundreds of prominent concerns are profiting immensely by using these sanders.

Two types of Canadian sanders are built—the Disc Sander and the Oscillating Spindle Sander. Both machines are equipped with New Departure ball bearings and General Electric motor. The table in each case can be tilted by a hand adjustment, 45 degrees down or 15 degrees up. Power is obtained by plugging into a lamp socket. Canadian Sanders are extraordinarily well built and are guaranteed against all defects.



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Canadian Sander Mfg. Co.,
Incorporated
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Wire Cloth

of every description

We make **Machinery Guards** of all kinds.

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Note On Grinding

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No. 74A

Monel Metal

Monel metal is an alloy consisting of approximately 67% nickel, 28% copper, and 5% other metals. It can hardly be distinguished from pure nickel in color and in tensile properties it closely resembles steel, as can be seen from the following table:

	Monel Metal Castings	Steel Castings
Melting Point.....	2,480° F	2,500° F
Hardness (Scleroscope) ...	20—23	22—25
Tensile Strength	72,000 lbs. per sq. in.	60,000 to 80,000 lbs. per sq. in.

Monel metal is tough and ductile and can be machined, forged, soldered, brazed, and welded by the electric or oxyacetylene method.

It lends itself admirably to casting and many very intricate patterns have been successfully cast. In rod form, its tensile strength is also high and it may be worked with equal facility either hot or cold.

In addition to its resistance to corrosive conditions, monel metal also resists oxidation due to its high nickel content, since nickel possesses in a high degree the property of withstanding the oxidizing influences of hot gases. Monel metal is used extensively for turbine blades and its selection is largely due to its great strength at high temperature, its resistance to the erosive action of steam and its resistance to corrosion. It is also used extensively for pump liners, rods, and valves, because of its extreme toughness and its resistance to abrasion and corrosion.

Other uses of Monel metal are in dyeing machiney, where the metal must withstand strong acid or alkaline solutions; pickling-tank fittings; golf club heads; needle valves in carburetors; tubes, wire cloth, and wire rope.

Monel metal machines with a long tough chip, in this respect resembling copper, but requiring somewhat more power to cut. For this reason the finishing of monel metal by means of grinding wheels or artificial abrasives is to be recommended. For the cylindrical grinding of this material on precision grinding machines, the usual grinding lubricants should always be used. Successful results are usually obtained with an Alundum vitrified wheel, grain 46, grades L or M or 24 combination, grades L or M.

For snagging castings composed of monel metal on floor stand or swing frame grinding machines, Alundum vitrified wheels, grain 16 or 20, grade Q, or grain 16, grade R, usually give satisfaction.

For cleaning heavy monel metal castings with a flexible shaft or portable electric grinding machine, our small 6" or 8" diameter wheels from ¾" to 1½" thick, grain 24, grades R or S Alundum vitrified have been used with success.

There is a certain demand for thin rubber bonded grinding wheels for use on abrasive cutting-off machines, for removing gates and risers from castings, and also for cutting rods, tubes, and wire. For these, we recommend 16 or 20 grit Alundum rubber bonded wheels from 10" to 12" diameter and from 3-32" to ⅛" thick.

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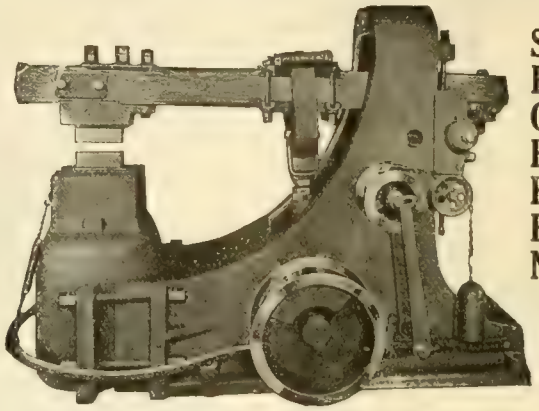

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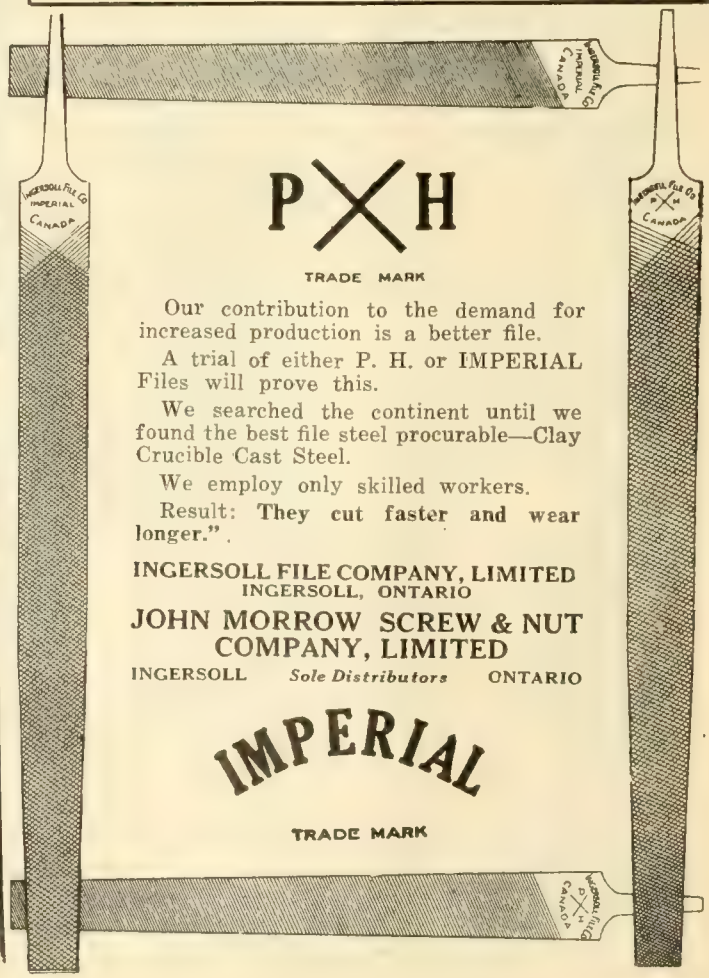

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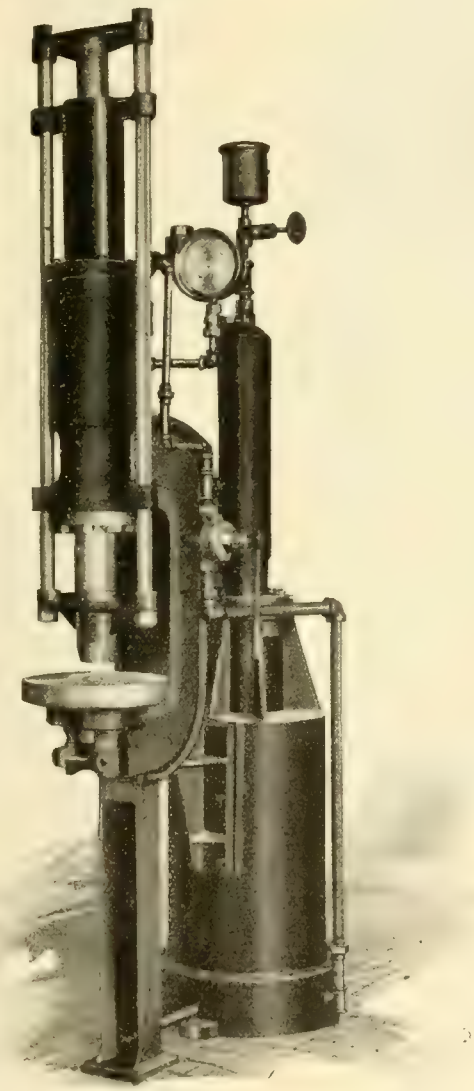

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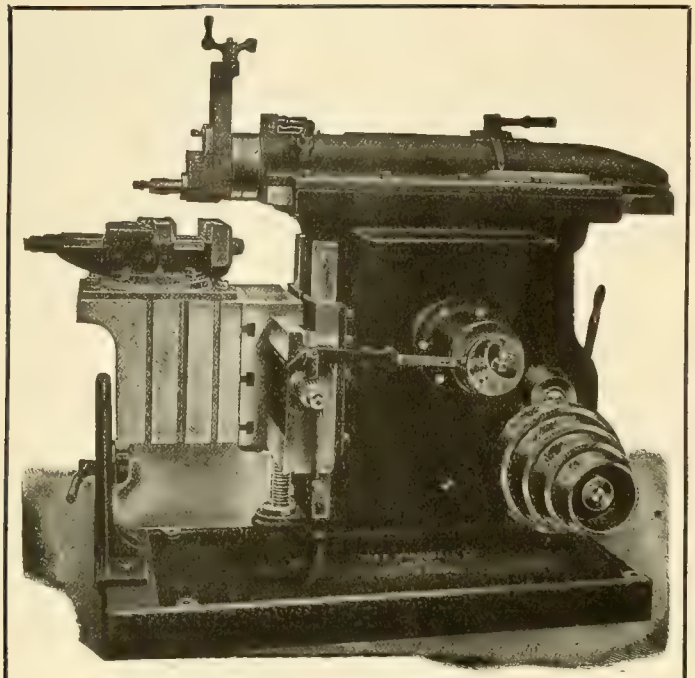

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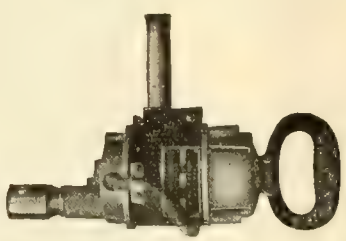

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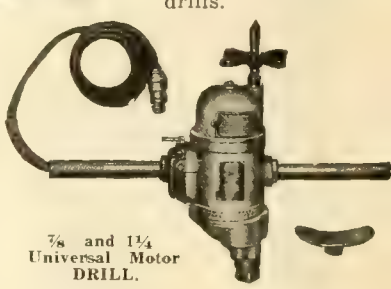

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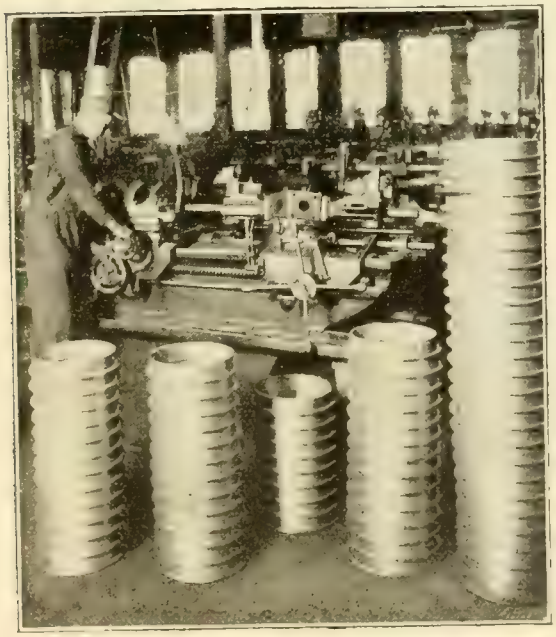

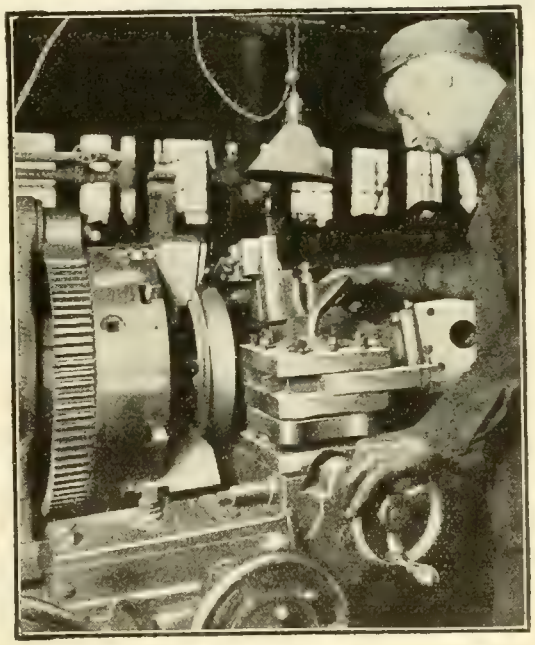

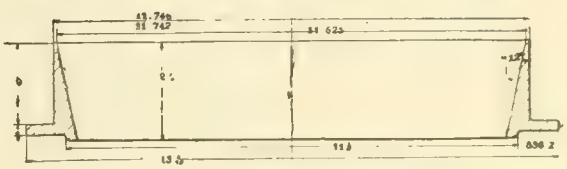

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CANADIAN MACHINERY
AND
MANUFACTURING NEWS

Vol. XXI. No. 19 November 13, 1919

Making *Coke* for the *Blast Furnace*

An Article Which Describes the Making of Coke in the By-Product Coke Oven

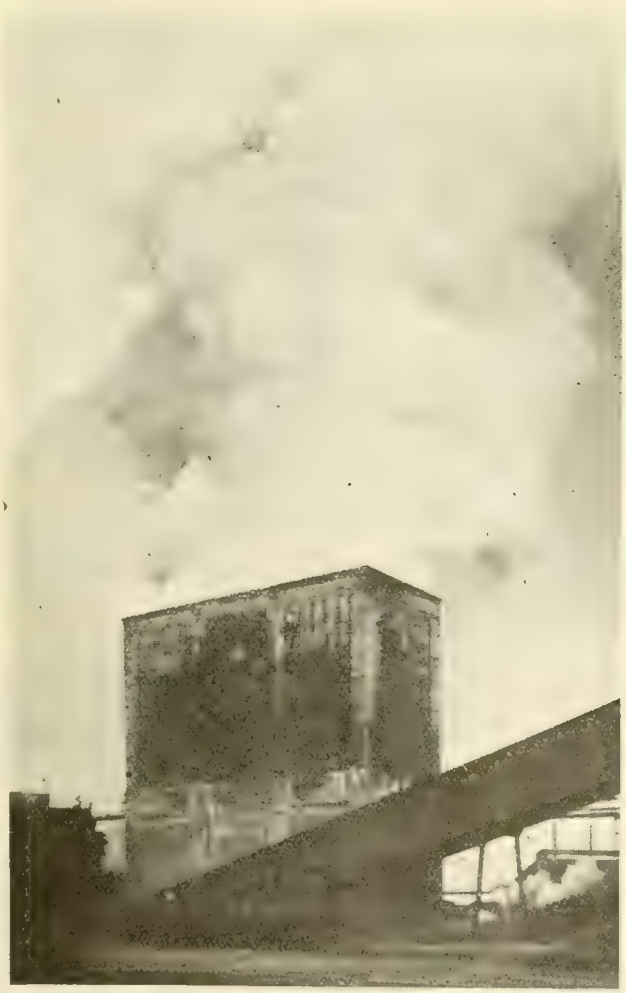
By W. F. SUTHERLAND

The Ovens Are Installed at the Hamilton Plant of The Steel Company of Canada

PRIMITIVE man probably first made iron in an ordinary fire, then improved upon his method by bettering the draft. Later on, the use of the bellows was adopted. The intentional making of cast iron and its conversion into wrought iron and steel followed at a later date and in the fifteenth century ornamental iron castings were made.

Charcoal was the fuel used and the appetite of even the crude furnaces then employed was such as to bring about the first agitation for fuel conservation. Queen Elizabeth forbade the cutting of wood in certain parts of the country and later, furnaces were prohibited in some counties.

This increasing scarcity of wood was probably the reason for the attempts which were made to replace charcoal by mineral fuel. In 1611 Simon Sturtevant patented the use of coal for iron smelting, but it was not until 1735 that Abraham Darby showed how to make cast iron with coke in the high furnace, which by this time had become a veritable blast furnace, although primitive. From this time on charcoal as a metallurgical fuel fell into disuse and is to-day only used where exceptionally pure iron is required.



On a quiet day when the clouds hang low the quenching tation is well worth observing. The steam given off in quenching rises to mingle with the clouds above.

The art of making coke, up to comparatively recent years, made little advance and the bee-hive oven in general use to-day resembles the original type very closely. Having the advantage of cheapness in construction and giving good coke, it suffers from the disadvantage of wasting all the gas and other valuable by-products obtained from the original coal. It is in its essentials, nothing but a brick-lined chamber in which the gas, driven off from the coal. It is, in its essen- the coking operation.

The modern by-product oven, a comparatively recent development, on the other hand conserves the gas, tar and nitrogen content of the coal and where combined with blast furnace and steel plant renders a cheap gaseous fuel available for open hearths and other equipment. It also enables the metallurgist to control the quality and physical properties of the coke to a nicety.

The Steel Company of Canada have been operating their new coke ovens at the Hamilton plant for about a year and the following article is descriptive of the plant itself and of its operating characteristics.

Coke used for blast furnace work should be hard,

GENERAL VIEW OF THE HAMILTON WORKS, THE STEEL COMPANY OF CANADA, THROUGH THE DIFFERENT DEPARTMENTS OF WHICH THE BY-PRODUCT COKE IS USED.

strong, porous and regular in composition. It is very light as compared with the coal from which it is made and it is estimated that 50 per cent. of its volume is air space. The amount of sulphur is of importance, for if much is present it enters the iron or necessitates higher temperatures in the blast furnace for its elimination in the slag. Generally speaking, coke with less than one per cent. sulphur is satisfactory.

Since the physical properties and chemical composition of the coke are of such moment, the grade of coal used is of importance. In the present case two kinds are employed, one running about 34 per cent. volatile and the other about 17 per cent. Both run about 8 to 9 per cent. ash content and contain .8 per cent. or less of sulphur.

The coal is unloaded into a receiving pit capable of handling two cars and from this is lifted by an apron conveyor onto a 30-in. belt conveyor. This conveyor, driven by a 50 h.p. motor, carries the coal to the top of the coal-handling plant where it is delivered into the crusher. The crushing is done by a Bradford breaker and on being crushed the coal is screened, the slate, etc., being separated and delivered to a reject bin.

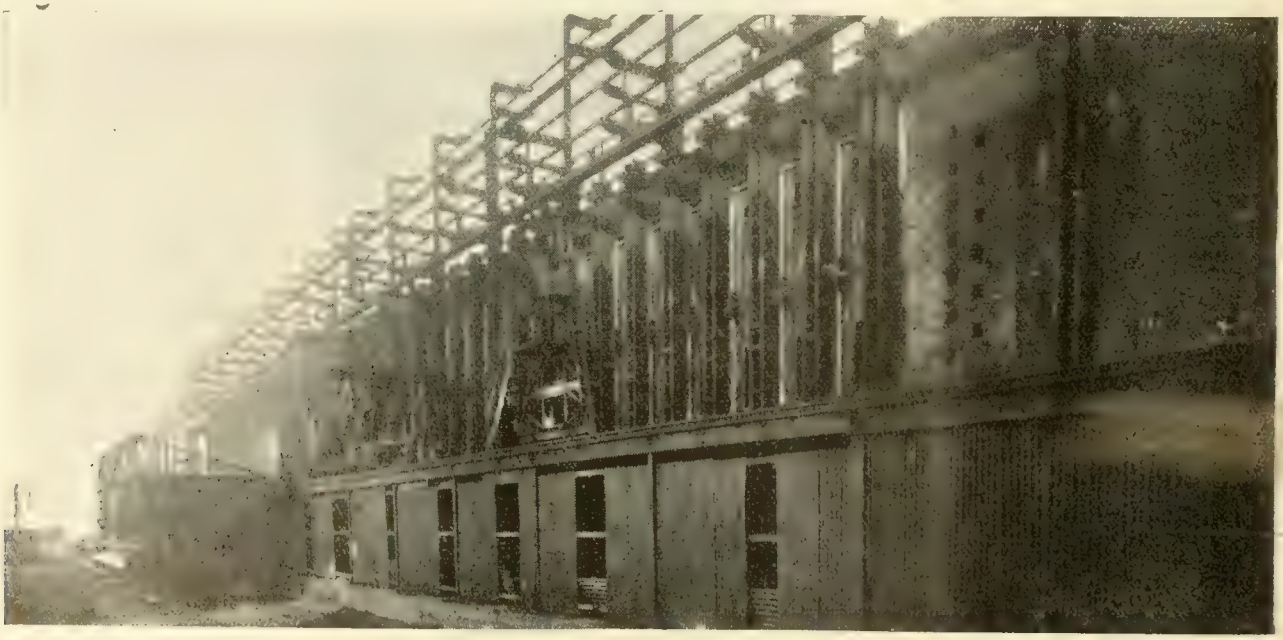
From the crusher the coal is delivered into either one of two mixing bins depending on its volatile content and from these it is drawn out onto the mixing table one floor below. This table consists of two short apron conveyors in line, with their upper surfaces travelling towards each other. The depth of coal on each conveyor is regulated by means of independently adjustable gates. By means of the gates any desired percentage of high and low volatile coals is obtained; at the present time the mixture runs about 85 per cent. high and 15 per cent. low volatile.

From the mixing table the coal now composed of the two grades goes to a hammer mill below, where it is pulverized fine enough for eighty per cent. to pass a ⅛-in. mesh screen. From the pulverizer the coal is conveyed by belt conveyors to a transfer tower and then at right angles by another conveyor to a coal storage bunker holding 1,400 tons. The hammer mill was supplied by the Williams Patent Pulverizer & Crusher Co., and is driven by a 300 h.p. three-phase Canadian Westinghouse induction motor of the wound rotor type. The mixing table is driven by a 10 h.p. squirrel cage induction motor, also of Canadian Westinghouse make. The coal-handling plant, together with the conveying system, was installed complete by Heyl & Patterson, Pittsburgh, Pa.

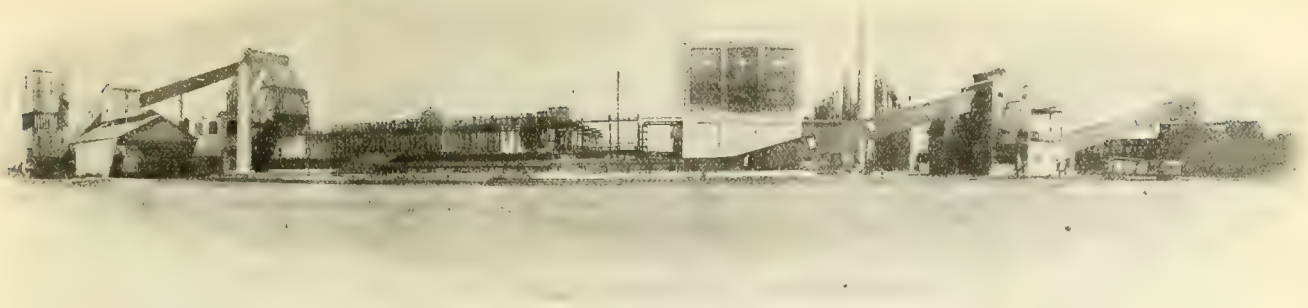
Coke Ovens

The Wilputte by-product coke ovens are arranged in two batteries placed end to end. Each battery consists of 40 separate ovens. Between each oven 28 flues are built into the side walls by means of which the ovens are heated by conduction through the brickwork. Below the ovens and flues proper, regenerative chambers are built in. These are filled with checkerwork and function similarily to those used with the open hearth. A cross-flue connects the tops of the vertical flues with whichever portion of the regenerator is on heat. The air necessary for the combustion of the gas employed passes through that side of the regenerator which is on blast and passes upwards into the twenty-eight vertical flues. At the bottom of these it meets the incoming gas and combustion takes place.

A balanced draft system is employed, that is forced draft delivers the air to the regenerators and induced draft removes the products of combustion. The fans for the air supply are of Canadian Sirocco type and are steam-driven. Three are provided, two in constant use and one



THE DISCHARGE SIDE OF THE COKE OVENS, SHOWING QUENCHING CAR.



A VIEW OF THE COKE OVENS, SHOWING THE COAL BREAKERS TO THE LEFT AND THE LOADING ELEVATORS TO THE RIGHT, OVER WHICH THE COKE IS PASSED IN BEING LOADED FOR SHIPMENT.

spare. The volume of air supplied is controlled from the chart room immediately above.

The induced draft apparatus is housed in a separate building and here three Canadian Sirocco fans are also provided, one of them spare as before. The products of combustion escape through two radial brick chimneys six feet by 75 ft. in height. These chimneys were installed by the M. W. Kellog Co., New York. The exhaust fans are steam-driven and the engines have 8 in. cylinders by 8 in. stroke.

Ordinarily it has been customary on installations of this type to dispense with induced draft fans and to use 200 ft. chimneys for the securing of the necessary draft. It was thought, however, that better regulation and control could be secured with the equipment installed, and operation has confirmed this opinion.

The gas necessary for the maintaining of the proper temperature in the ovens is supplied by two sixteen-inch mains which are carried along the outside walls a few feet above ground level. From these gas mains risers are led off and into the flues. Each riser is equipped with a valve actuated by a rod running the full length of each battery and operated by a motor-driven controlling mechanism.

The air supply is also controlled by reversing valves, motor-operated, and at each half-hour period the flow of air through the regenerators is reversed.

Chart Room

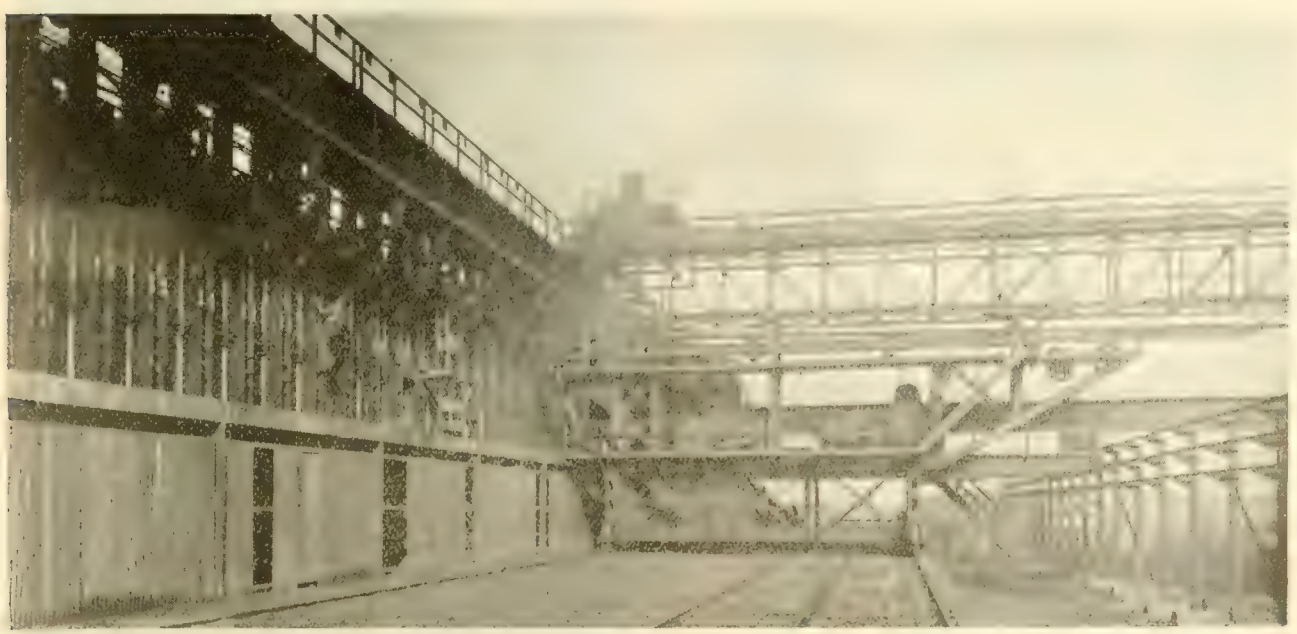
Between the two batteries and over the fan room, a chart room is located. All recording instruments and controls are brought together in this room which provides a central point from which all operations can be directed.

The gas consumed in the heating of the ovens is here measured by two Venturi meters and the pressure on the gas main, the forced draft and induced draft pressures are measured by three Bacharach pressure recording gauges for each battery.

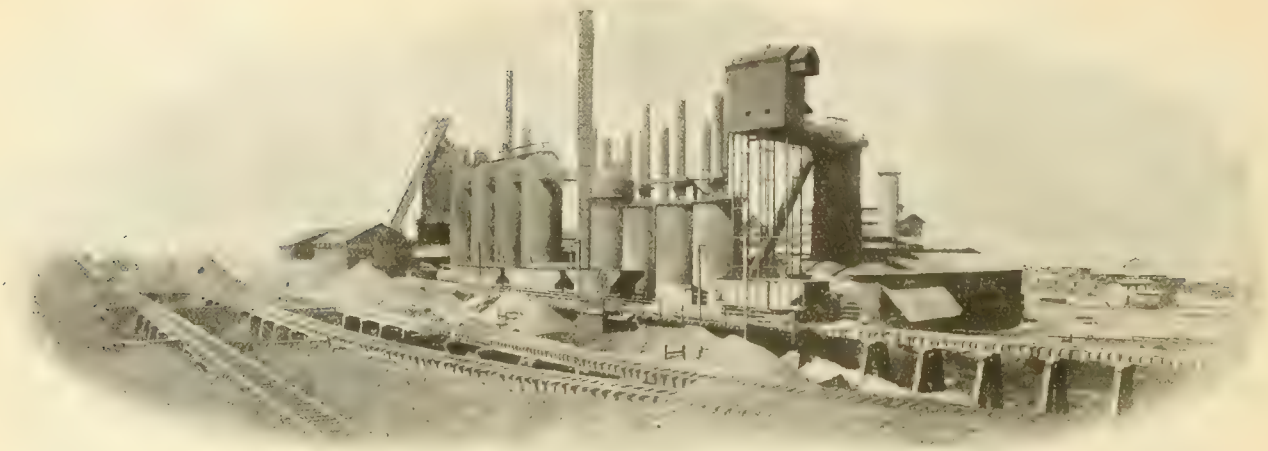
Charging

The ovens are charged from above through four openings to each oven. A charging lorry with four bins travels the full length of the two batteries and receives its supply from the 1,400-ton bunker which is located overhead. Each hopper of the charging lorry holds sufficient coal for the charging of its portion of each oven. Between the ovens and immediately over each of the twenty-eight flues in the side-walls inspection holes are provided by means of which the condition of the brickwork and the combustion going on below can be observed.

When the charge in each oven is converted into coke it is removed by a pusher, almost human in its functions. The pusher travels the full length of the two batteries and is provided with three rams, one of which lifts the oven door off and draws it back out of the way, rocking it about a horizontal axis first to break the clay luting provided for gas tightness. The second ram, when this is accomplished, is advanced and pushes the coke through the door at the other end of the oven. The third ram is used after the doors have been placed back in position



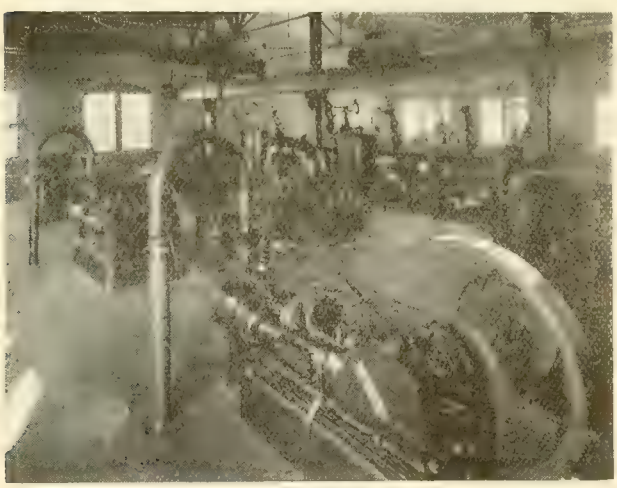
THE COKE PUSHER WHICH REMOVES THE OVEN DOORS, PUSHES THE COKE OUT ON THE OTHER SIDE INTO THE QUENCHING CAR AND THEN LEVELS DOWN THE FRESH CHARGE.



THE BLAST FURNACES AND ORE PILES. THE MAJOR PORTION OF THE BY-PRODUCT COKE, PRODUCED IN THE COKE OVENS, IS USED IN THESE BLAST FURNACES.

and when the fresh charge is placed. It is advanced and withdrawn several times through a small opening in the door and serves to level off the top of the charge.

The main pusher ram is driven by rack and pinion



THE EXHAUSTERS SHOWN HERE BRING THE GAS OVER FROM THE OVENS INTO THE BY-PRODUCT PLANT.

through two intermediate gear trains from a 75 h.p. motor of railway type. A magnetic brake is provided. The levelling ram is driven by a similar motor through a drum and cables. The door extractor is advanced from the cab and its further operation controlled by the door man on the platform. The coke pusher was supplied by Wellman-Seaver-Morgan, Cleveland.

The doors on the discharge side of the ovens are removed by a travelling extractor which is also provided with a coke chute to guide the red hot coke over the platform and into the quenching car below. The quenching car on receiving its load travels to a quenching station, shown in our first illustration, where the coke is wet down and later discharged onto an incline from which it makes its way by conveyor to the coke-handling plant.

The temperature at which the ovens are run has an important effect on the life of the brickwork; at this plant the side-wall temperature carried is 2,200° Fah. Silica brick are used of Harbison-Walker manufacture.

By-Product Plant

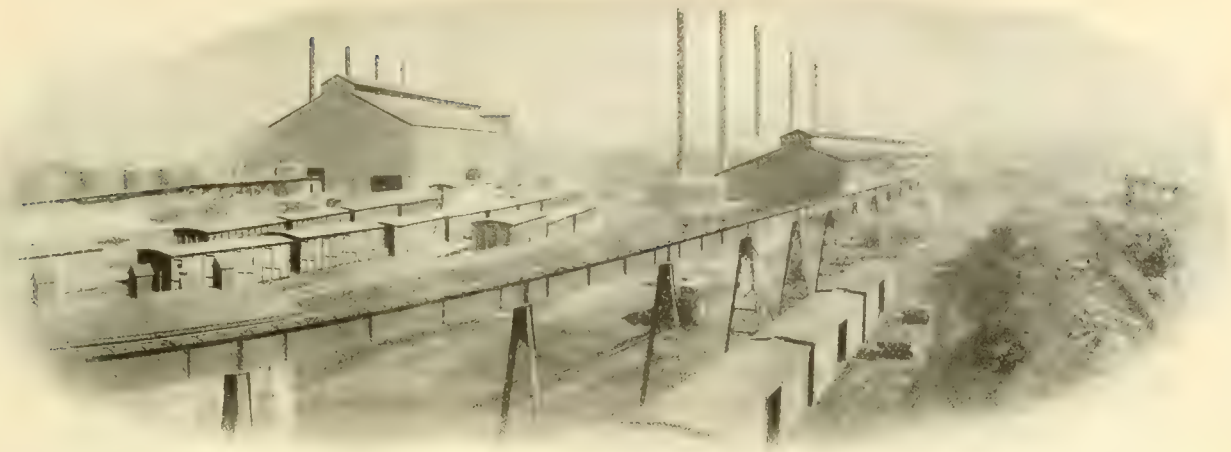
In the making of coke a number of valuable by-products are given off, gas which has a high calorific value, coal tar which finds use in the chemical industries and as a fuel, and ammonia compounds. All of these have considerable commercial value and when used in the steel mill or sold, materially lower the cost of the coke. A by-product plant is installed which purifies the gas and recovers the tar, ammonia content, and naphthalene carried over from the ovens.

Each oven is provided with an ascension pipe through which all volatile matters driven off during coking pass. Each pipe is equipped with a cap opening to atmosphere and a mushroom valve, and terminates in a common header. When charging, the gas driven off is allowed to escape until the operation is complete when the mushroom valve is opened and the gases allowed to pass into the header. The header running the full length of the two batteries has tar constantly circulating through it to catch any particles of free carbon carried over.

From the header the gases pass over the pusher runway to the by-products plant and enter the condensers or primary coolers. These primary coolers, shown in one of our illustrations, are three in number, one of them spare. Each of them contain about 900 tubes through which water is constantly circulated on the counter-flow principle. The gases passing over the tubes have their temperature materially lowered and here most of the tar is thrown down, together with ammonia liquor and some naphthalene.

From the primary coolers the gas passes through the gas exhauster plant which provides the suction necessary

ONE OF THE GAS MAINS ON THE COKE OVENS SHOWING THE RISERS AND VALVE CONTROL.



THE OPEN HEARTH STEEL FURNACES, WHICH ARE HEATED BY THE GAS AND TAR PRODUCED BY THESE MODERN OVENS. GAS AND TAR ARE TWO OF THE VALUABLE BY-PRODUCTS.

to draw it over from the ovens. Three units are again provided here, two of them constantly in use and the third one as a spare. The blowers are built by the Connersville Blower Co., Connersville, Ind., and have a displacement of 51.7 cu. ft. per revolution. They are steam-driven, and Fleming engines are employed, made by the Harrisburg Foundry and Machine Works, Harrisburg, Pa. These units are controlled by electrical pressure regulators made by the Rateau Battu Smoot Co., New York. The speed is automatically varied according to amount of gas coming from the ovens and by this means a constant suction is maintained.

From the exhaustor the gas passes to the tar extractors which eliminate any tar fog which may remain. These extractors are three in number, one of them spare, and consist of vertical tanks which contain sheet steel bells perforated with 1-16 in. holes. The holes in successive cones are staggered and any particles of suspended tar are thus eliminated.

The gas is now free from tar but still contains considerable ammonia vapor. This is eliminated by the saturators through which the gas next passes. Three in number as before, these consist of large cast iron tanks lead-lined in which a 6 to 8 per cent. solution of sulphuric acid is maintained. The gas passing through this acid liquor gives up its ammonia content which unites with the sulphuric acid to form ammonium sulphate. As this

COKE AFTER BEING QUENCHED.

THE PRIMARY COOLERS IN WHICH THE GAS IS COOLED AND IS FREED OF THE GREATER PART OF THE TAR AND AMMONIA LIQUOR.

salt accumulates the solution becomes saturated and crystals of ammonium sulphate are thrown down. To effect their removal the principle of the air lift pump is adopted. A jet of air is blown into the bottom of a vertical discharge pipe and carries with it the crystals of sulphate together with some of the acid liquor. Flowing out of the saturator at the top, the mixture passes into lead lined settling trays where the ammonium sulphate falls to the bottom. It is then thrown into steam-driven, centrifugal separators where any remaining acid liquor is thrown off. The liquor is here recovered, and that from the starting point from which countless coal tar dyes monium sulphate is taken to the salt room where it is bagged and shipped to outside consumers.

Quite a romance might well be written about the by-product end of the coke industry. The coal tar is the starting point from which countless coal tar dyes and chemicals are made, and the nitrogen content of the coal is of great value to agriculture and other industries. Nitrogen compounds are essential to vegetable growth, and when these have been exhausted in the soil through intensive cultivation, artificial fertilizers are necessary.

Sulphuric acid has to be added to replace that used in the formation of the ammonium sulphate and it is found that about one pound of acid is required for each pound of sulphate made.

A GENERAL VIEW OF THE BY-PRODUCT COKE OVENS.

Ammonium sulphate or sulphate of ammonia is one of the most valuable of nitrogenous fertilizers owing to its chemical and other characteristics, and that made at this plant goes to practically every corner of the world. Japan is one of the largest consumers; Java, the Barbadoes and other countries use vast quantities of this fertilizer and it finds considerable use in the cotton-growing countries of the tropics.

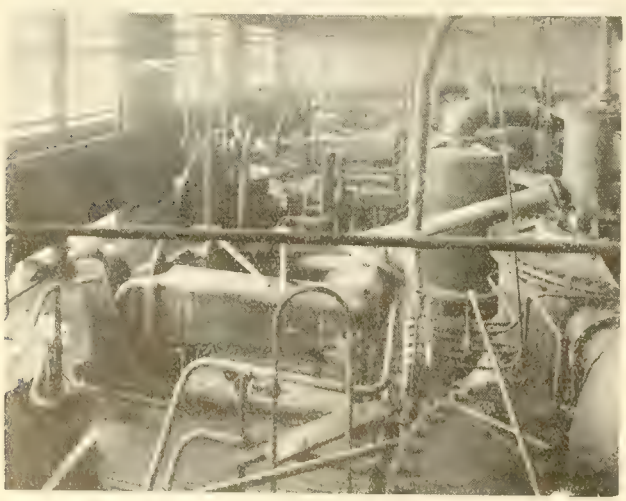
The product exported and otherwise sold by the Steel Company of Canada is aptly named "Gromore," owing to its important usefulness as a fertilizer, and has a whitish or grayish color. Its importance as a plant food is due to the fact that it contains 25 per cent. ammonia and more than 20.5 per cent. nitrogen. This makes it the richest of nitrogenous materials.

Ammonium sulphate can be used alone as a fertilizer, but more often reaches the farmer in the form of mixed fertilizers. It can be used with acid phosphate, potash salts, cotton seed meal, tankage and fish scraps. It is not subject to chemical action when thus incorporated into a mixed fertilizer and its freedom from free acid and moisture is also of advantage.

Disposal of Gas

The gas, now free of tar and ammonia, finally passes through a washing tower where it meets a spray of water and is made ready for use. The water passing through this tower removes the naphthalene present in the gas and this is caught in settling basins for disposal.

From the washer the gas goes to the gas holder and from this it is distributed to the open-hearths, the boiler room and to the coke ovens. That portion which goes to the open-hearth furnaces passes through an exhauster which raises its pressure to 5½ lb. The "Root" exhauster is driven by an R. 20x20 in. Ridgeway engine and has a capacity of 8,000,000 cu. ft. per 24 hours.



THE SATURATORS IN WHICH THE AMMONIA IN THE GAS IS CONVERTED INTO AMMONIUM SULPHATE.

Tar Storage and Ammonia Still

The tar and ammonia liquor begin to separate out at the header on the coke ovens and each header, and connecting pipe contribute some to the total yield. By far the largest portion is recovered in the primary coolers and the remaining small fraction of the yield is obtained by the tar extractors. All the tar and ammonia liquor collected from the above sources is pumped into a separating tank. The tar, having a specific gravity of 1.2, settles to the bottom of the tank and is pumped into a tar storage tank. The ammonia liquor flows off and into an ammonia tank. About 25 per cent. of the total ammonia yield is obtained from the liquor, and since this quantity is well worth recovering the liquor is treated.

SALT ROOM IN WHICH THE AMMONIA SULPHATE IS STORED.

The weak liquor is pumped from the tank into an ammonia still where it is subjected to heat from low pressure steam. The heat serves to drive off the free ammonia and the addition of lime frees the fixed ammonia.

The mixture of steam and ammonia vapor passes into a dephlegmator or condenser which cools the mixture down below 212°, to 190° to be exact. At this temperature the steam is condensed while the ammonia remains as a gas and passes on into the main gas line before it enters the saturators. Here it is converted into ammonium sulphate together with the 75 per cent. which comes over direct in the main gas line.

The operation of the by-product plant necessitates the handling of various kinds of liquids and a pump room is provided for the various pumps. Tar pumps of both centrifugal and duplex plunger type are provided for flushing the tar through the mains and headers. The centrifugal pump is of the Goulds single-stage type and has a capacity of 660 U.S. gallons against a 90 ft. head. It is driven

THE COAL STOCK PILES, SHOWING THE ENORMOUS TONNAGE OF COAL ALWAYS ON HAND TO SUPPLY THE COKE OVEN REQUIREMENTS.

by a Canadian Westinghouse 30 h.p. induction motor.

Two air compressors are also installed, made by the Chicago Pneumatic Tool Co.

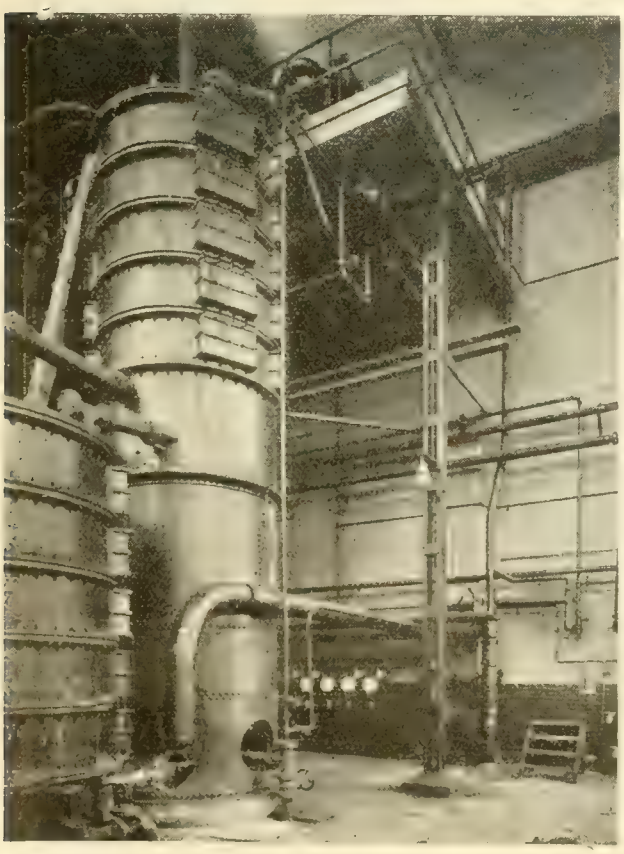
Operating Characteristics

Approximately 13 tons of coal are charged into each oven at a time. The coking time is 17½ hours and 108 ovens are charged per day, producing 900 tons of coke. Of this quantity the greater portion is required for the Steel Company's own blast furnaces, the remainder being disposed of to outside firms.

Each ton of coal as fired produces 11,000 cu. ft. of gas, 11 U.S. gallons of tar and 27 lb. ammonium sulphate. Forty per cent. of the gas is used in heating the ovens and the remainder is available for other plant purposes. The tar, together with most of the gas, is used in firing the open-hearth furnaces of which there are eleven. From each ton of coal three-quarters of a ton of coke are obtained.

Steam Generation

A considerable quantity of steam is used for the ammonia still and for the various engine-driven fans and exhausters. For the generation of this steam a boiler plant of 750 boiler horsepower has been erected.



THE AMMONIA STILL IN WHICH THE AMMONIA LIQUOR GIVES UP ITS AMMONIA CONTENT.

Three Erie City double-drum water tube boilers are installed of 250 h.p. each. A steam pressure of 150 lb. is carried and the steam is superheated 100°.

In the making of coke considerable coke breeze or dust is made and this is used as a boiler fuel. The coke-handling plant screens all the coke and the fines are taken by belt conveyor to the boiler house. Here they undergo a further screening, chestnut size and over being eliminated, the remainder dropping into the bunkers in front of the boilers.

Coxe travelling grate stokers made by the Combustion Engineering Corporation, New York, are fitted to the boilers and are specially designed for the burning of the coke dust. This fuel is difficult to burn and in order to keep the ignition arches at the proper temperature it is necessary to burn gas as a supplementary fuel. Four two-inch gas pipes are led into the combustion chamber of the boiler setting above the grate and the gas passing through them is burned by excess air through the grates, no other air supply being needed. About 250,000 cu. ft of gas is burned per 24 hours in addition to the coke screenings.

The boilers are fitted with Diamond soot blowers made by the Diamond Specialty Co., Detroit and Windsor. All valves used in the boiler house are of Crane manufacture. Forced draft is supplied by a Canadian Sirocco fan provided with two engines, one of them spare. Pin and belt type clutches are provided for changing over from one engine to another.

The feedwater is heated in a Cochrane feedwater heater to 210° Fahr. Exhaust steam from the engines at 15 lb. back pressure is used for this purpose.

The feed pumps are in duplicate, two Canadian Fairbanks-Morse 10x6¼ duplex plunger pumps being installed.

The boiler house is some distance from the by-product plant and two six-inch steam lines are provided. These, for part of the distance, are carried overhead on structural frame work.

Construction

The coke ovens and other equipment including the by-product plant and boiler house were designed and installed by the Wilputte Coke Oven Corporation, 469 Fifth Ave., New York City, who also acted as their own general contractors. The silica brick necessary for ovens, etc., was supplied by the Harbison-Walker Co., Joliet, Ind., while the firebrick was furnished by The Evans and Howard Firebrick Co., St. Louis, Mo. All tanks and tankwork were supplied by the Jas. G. Hagey Co., Joliet, Ind. The coal and coke handling plant was furnished by Heyl & Patterson, Pittsburgh, while the Hamilton Bridge Co. furnished the structural steel. The two radial brick chimneys for the coke ovens and a similar but larger chimney for the boiler house were supplied and erected by the M. W. Kellog Co., New York City.

The Styles of Yesterday in Machine Tools

Styles Change in Machinery as Well as in Clothes and the Machine Tools of Yesterday Are Apt to Look Somewhat Queer to Our Modern Eyes

By J. H. MOORE

IN starting an article of this nature the writer is sorely tempted to ask the question: "What length of time should a machine-tool remain in use and yet be termed a machine tool?" In other words, when does it cease to be a machine tool with working possibilities and merely a decoration for the scrap heap?

While this question may seem a simple one on the surface, the writer believes it a very difficult one to answer off-hand, for there are so many points to be taken into consideration. Many an old machine tool has weathered the storm of time, due to receiving careful attention, while other tools, more modern in design, have gone under before their time simply through carelessness on the part of the operator.

For the purpose of this article, we will decide that a tool deserves the name of machine tool so long as it delivers all that is required of it, so on this assumption we will proceed with our story.

In a certain plant in Canada (name not being mentioned, this having nothing to do with our story) there stand two wonderful examples of tool equipment. The first is that of a lathe seventy years old, and the second, a planer whose life has reached the age of seventy-five. Of course, as can be surmised, these tools are slightly? out of date, yet they deliver all that is required of them in an accurate manner. To quote what the owner remarked to the writer: "So long as they remain faithful and serve our purpose why should we dispose of them?"

Not being a salesman of more modern equipment I did not even raise an argument, but proceeded to photograph the tools under discussion.

Fig. 1 illustrates what the camera discovered on its first exposure on Mr. Planer. We see a general view of this machine, just as it appeared after work has been taken off its bed some few hours before. No attempt has been made to tidy it up, but the view has been taken to show it at its worst.

This machine was made by W. H. Gibson & Co., of Rochester, N.Y., some seventy-five years ago. Since then this machine has led a varied life, but even yet is plugging along with wonderful results. At the present time it is engaged chiefly in planing dies, which have a semi-circular contour. A special tool is of course used in the planing head, but the point is this, that the machine turns out the work in splendid shape and in good time. After all, what more is necessary? To get away from the work that the machine is doing and consider the machine itself, let us look at a few differences between this machine and the modern planer.

Note the fancy curved contour at A and compare this with the straight business-like design of modern planers today.

To consider a closer view of this machine, let us look at Fig. 2. Can you imagine the modern machine-tool carrying such fancy decorations on its sides as shown in this picture? Evidently in those days they firmly believed in establishing the nationality of their machines, for the eagle and the stars and stripes tell their own story.

FIG. 2—DECORATIVE TREATMENT ON PLANER.

Last, and perhaps most important of all, we come to Fig. 3. Can you imagine the modern planer equipped with a trip such as shown? The more one looks at it the more one wonders, and yet the basic principle is exactly the same, and although crude in its design, it accomplishes its purpose. The design of neat handles, knobs, etc., was no doubt an unknown quantity in those days. Note the neat? little knob A, which the operator could grab at will on the trip lever. One thing sure he could hardly miss it.

One need only look at the edge of the table on this machine and realize how long it has been in use. From one end to the other are set-screw marks, worn right into the table, where the dog set-screw was tightened. Readers can note this by looking at the photograph.

These few photos give readers some idea of this old-timer, but as one of the workmen said: "If you could only photograph its noise, your fortune would be made." There is no doubt about it as regards noise, for when this machine was started you certainly knew it was in operation, but old age, noise, and all else is superseded by the fact that it delivers the goods.

At Fig. 4 we show a picture of a lathe which has seen seventy-five years of service. This machine was made by I. Anzell, Rochester, N.Y. There are several features on this lathe to which we would like to call your attention. First, look at the saddle A. Readers will no doubt see some difference between this saddle and the type used on the modern tool of the present day?

The thumbscrew B takes over the important task of locking the saddle. This method has also been slightly? improved since those days.

Next let us consider the face-plate C. Note its narrow face and peculiar con-

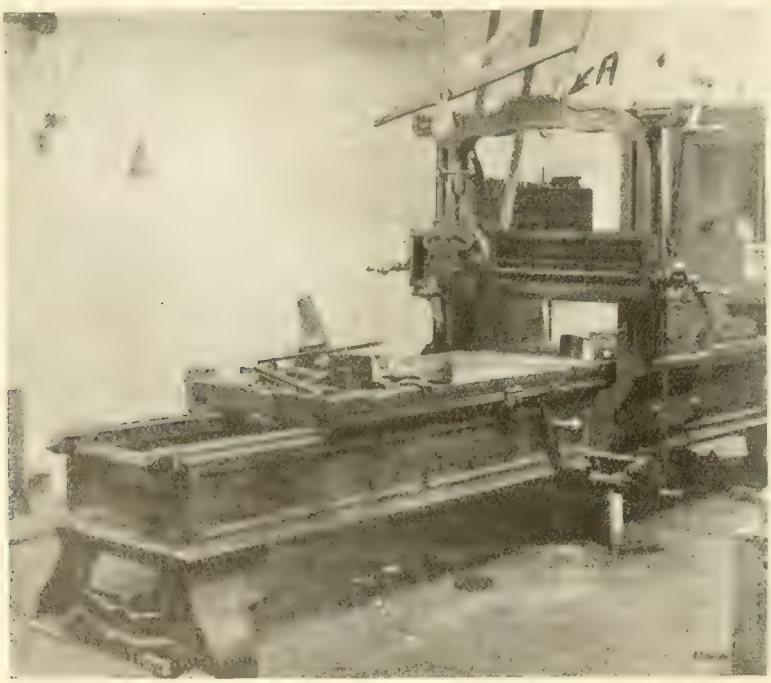


FIG. 1 GENERAL VIEW OF PLANER

struction. Attention is also called to the bearings D. Evidently the importance of wide bearings did not appeal to designers at that time. To hold the train of feed gears in proper mesh the clamp E is called into service and does the work exceedingly well. In addition to these features note the small width of face on all the gears. Finally let us look at the foot F. Here we see the designer's nightmare. Can you imagine a lathe with feet like these at the present time? The back gear is placed in and out of mesh by means of a slotted quadrant, together with an ordinary bolt and wing nut, but enough.

We have, so to speak, picked flaws in this old tool to our heart's content, and yet what is the answer? Joe Mynard, the old chap who operated this lathe for fifty years, claimed it was a good pal to him. Readers may not credit it, but according to the story Joe actually wore a hole in the floor where he stood working this lathe, and they had to patch it up—the floor, not the lathe. Whether this was due to Joe standing on one spot or not, the writer cannot say, but this old tool is still doing duty, turning certain classes of work with good success, relieving the more modern tools of work which would hold production up.

This article has not been an attempt to advocate using tools until they fall apart. Far from it, for the writer's personal opinion is not concerned in this tale. This idea is merely to present before readers an interesting story of how at least two old relics are holding their own.

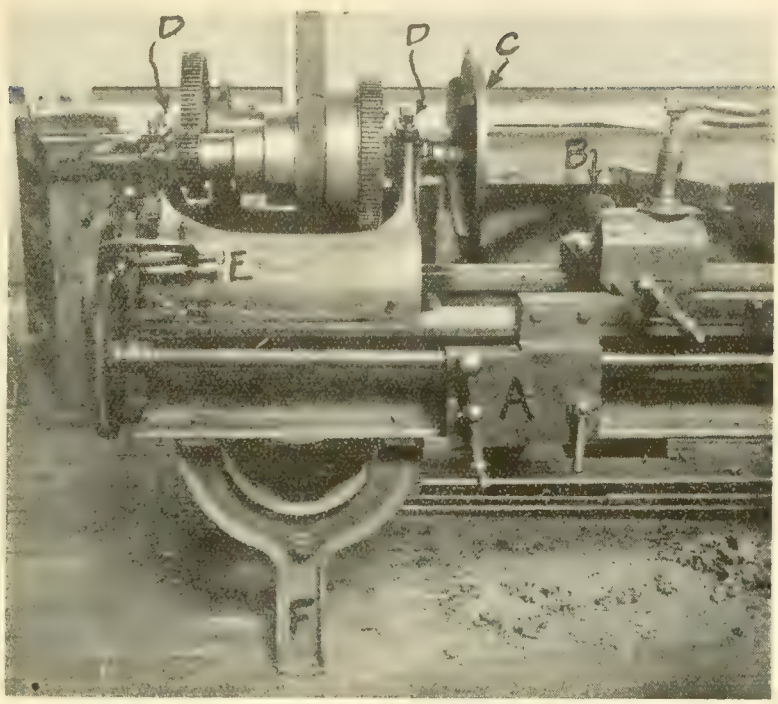


FIG. 1 OLD LATHE.

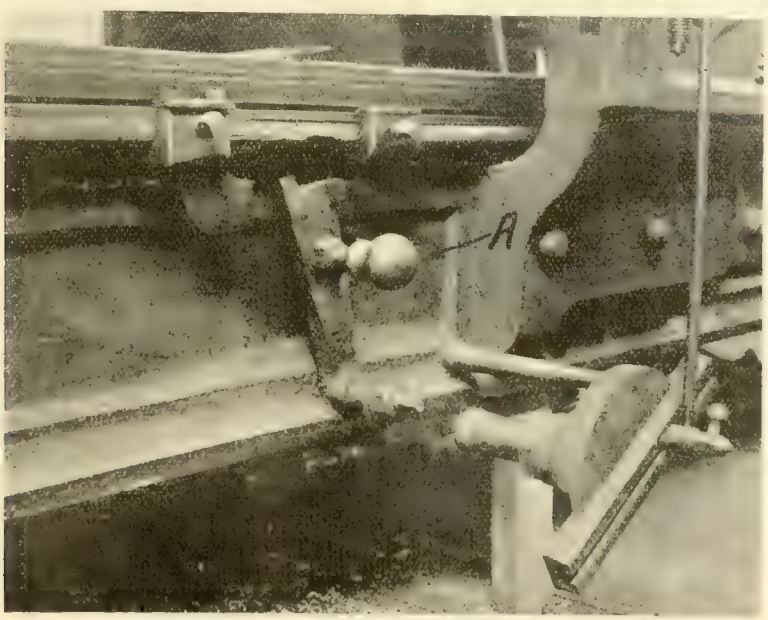


FIG. 3 TRIP MECHANISM.

VANCOUVER CO. INSTALS A "GREAVES-ETCHELLS" ELECTRIC FURNACE

After an extensive investigation of the various types of electric furnaces and a visit to the U. S. Navy Yard at Puget Sound, where a 6-ton "Greaves-Etchells" furnace is in operation, the Vancouver Engineering Works, Ltd., Vancouver, B.C., has given an order to the Electric Furnace Construction Company for a "Greaves-Etchells" furnace.

In a recent paper presented before the American Society of Mechanical Engineers Mr. N. C. Harrison defines pulverized coal as coal that has been reduced to such fine particles that at least 95 per cent. will pass through a 100-mesh sieve having 10,000 openings to the square inch. In other words 95 per cent. must be less than one two-hundredth of an inch cube. He goes on to say that "the average person does not fully realize to what a high degree of fineness it is possible to reduce the coal to-day by pulverization. The finer coal is pulverized the more efficiently it can be burned and the more readily it will be diffused when mixed with the air for combustion and fed into the furnaces. Pulverizing certainly does not change the nature of the coal, but it does change its form to a certain extent in that the coal is changed from a solid into a fuel having liquid properties. As the coal is pulverized it is mixed with air, and when handled in the conveyor it flows like water; when fed to the furnaces it is more or less like a gas, and the furnaces must be designed to burn a gaseous mixture."

In order to facilitate women's work in the repairing shops of the Orleans Railway Company at Paris, where, as in Great Britain, feminine labor is becoming more and more in demand, a very practical portable oxy-acetylene welding apparatus has recently been introduced. It consists of the usual cylinder of oxygen, filled under a pressure of 10 kilos, and the acetylene reservoir, these being mounted on a two-wheeled wagon which can be easily moved from place to place even by a mere girl. India rubber tubes several yards long connect the gases with the blowpipe, which is provided with the customary safety arrangement. In addition, the welder has within easy reach a stop-cock, enabling her to regulate the flow of the oxygen and acetylene before they reach the mixing chamber of the blowpipe. It has been found that, thanks to this handy apparatus, a woman worker is able to do a multitude of small soldering jobs with great rapidity and, what is equally important, with a minimum of fatigue. The apparatus is perfectly safe, and the operators find no difficulty in using it.

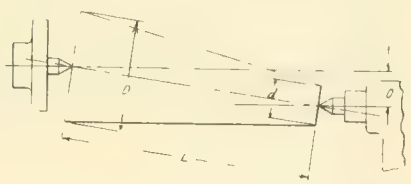
Shop Arithmetic—Problems on Taper Work

No Matter Whether You Have to be Accurate on Every Occasion, it is Well to Know How to do the Thing and Get Absolute Results

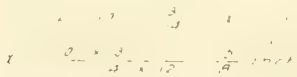
By J. H. RODGERS, Montreal

THE problem of machining tapers is one very frequently met with in the daily work of the average mechanic, and while accurate calculations are not always essential, the knowledge of the necessary principles involved in determining the proper offset of the tailstock center, the angle of inclination of the compound rest or dividing head of the milling machine, or other machine tool accessories, is often of considerable advantage to the man on the job possessed of such acquirements, thus enabling him to avoid those inefficient cut-and-dry methods that are sometimes adopted for work of this character. The advantages derived by using a few simple rules and formulæ will amply repay any effort expended in acquiring the principles of applying the same.

When speaking to a lathe hand regarding a taper, he would immediately think of a piece of metal of a conical shape as turned between the centers of the lathe. To illustrate the general appearance of a taper when turned in the lathe, the sketch is given.

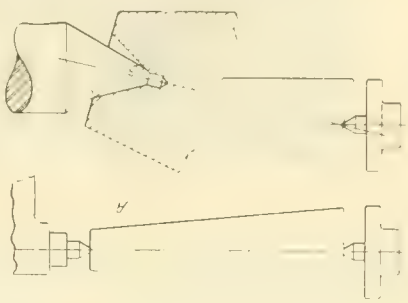


In calculations for tapers of this character, the three primary requirements are the two extreme diameters and the length included between such diameters. Suppose it is required to turn a piece of steel of a conical shape like that shown above, the length of which is to be 10 inches, the large diameter 4 inches, and the taper to be ¾ inch per foot; what would be the diameter of the small end? With a taper of ¾ inch per foot, the taper of the 10 inches would be:

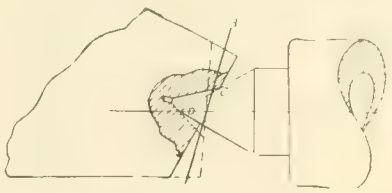


Therefore, the small diameter would be 4—⅝=3⅜ inches, and the offset, indicated by 0, would be ⅝÷2=5-16 inch. The solution is based on the exact length of the tapered portion, but the accurate adjustment must be determined by actual test, as conditions are never such that the set over can be definitely determined, owing to the varying depths to which the lathe centers enter the work.

There are certain factors involved in machining tapers that do not come directly under the head of shop arithmetic, but of which it might be well to speak of while on this subject, as they are of vital importance to successful results. One of the primary conditions in connection with taper turning, is the imperative need of perfectly square ends on the work, faced at right angles to the central axis. This is made more clear by referring to the accompanying sketch.

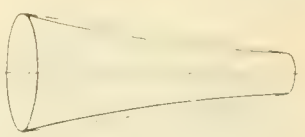


When the centers are drilled in the end of the shaft, they form the ends of the axial center, and when the tailstock spindle is in a central position, the centers of the lathe and those of the work will coincide, as shown at A. To form the taper, however, the tail center must be moved over an amount equal to one-half the difference between the large and the small diameters, as shown at B —tail end greatly exaggerated—and in doing so, the lathe centers are out of alignment, and remain in such position while the taper is being turned. From this it will be readily seen the necessity of having true ends to the shaft. The heavy line A-A indicates the neutral line of the end, or the face as it should be when properly squared off. In turning work by setting over the tail stock, the bearing points on the tail center are at C and D, and if the edge of the shaft center is irregular, it will affect the smooth movement of the work and the shape, when turned, would be eccentric instead of circular.

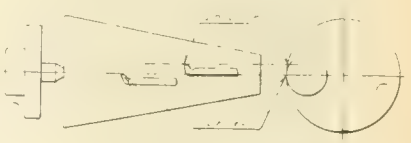


In the more modern types of lathes, that are fitted with taper attachments, this condition is eliminated, but the need of true ends should always receive the best attention. Another factor well worth mentioning and remembering, is that of keeping the cutting point of the tool in the same horizontal plane as the lathe centers. For a straight edge to bear along the full length of a taper cone or frustum of a cone, one end must coincide with the apex of the cone, as indicated in the sketch below:

The straight edge here corresponds to the lateral movement of the fixed tool. If the tool point is on the same level as the lathe centers, or where a radial movement of the tool on the work would cause the point to pass through the axial line, the turning of the work will result in a true conical surface, but should the tool be above or below the center, the work will have slight concave shape, as here shown (greatly exaggerated).

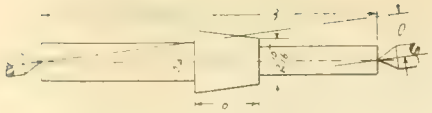


This might be made more clear by an end view of a tool setting on taper work.



Here is shown an elevation and an end view of the work, and the importance of the above advice regarding tool position, is quite obvious.

In the case of the taper attachment, the calculations are very similar, but allowance must be made for difference in length between the work and the taper slide. It is seldom, however, that a piece of wark is required where the taper extends over the entire length of the piece, and the method of determining the set over of the center, or the inclination of the taper slide, must be governed by the existing conditions. Suppose we have a shaft 3 feet long, and a taper is desired on a 6-inch section, that has diameters of 3¼ and 2 15-16 inches, what would be the set over of the tail stock center?



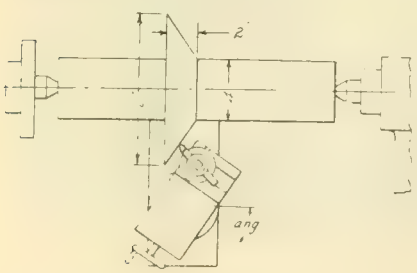
As the taper of the 6-inch section is 15-16 of an inch, the set over would be in direct ratio to the lengths, or, with X representing the offset, the solution would be:

$$\frac{3}{16} \quad 2x \quad 6 \quad 36$$

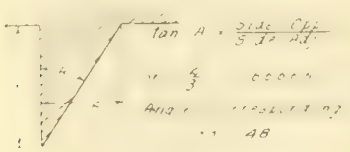
$$2x = \frac{5}{6} \times \frac{36}{6} = \frac{5}{8} \cdot 1\frac{7}{8} \quad \text{and}$$

$$x \cdot 1\frac{7}{8} = 2 = \frac{15}{16} \text{ inch}$$

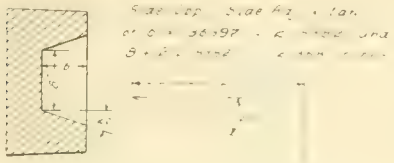
Where tapers are so abrupt that offset of the tail stock, or the use of the taper attachment is impossible, the compound rest must be brought into service, and this method permits of the lathe centers being in perfect alignment, so that more accurate results are obtained. This practice, however, involves calculations that are a little more complex than the other, but are easily understood after a few practical applications. Suppose we have a taper to turn like that shown below:



While an approximate setting could be obtained from working from the face plate, with a square and scale, the more accurate method would be to solve by "trig" for the required angle at which to set the compound rest. The solution, diagram, and the necessary calculations, are shown below:



A case may arise where the angle is known, and some of the dimensions, but the one most desired by the operator is not given. For instance, a die is required as shown below, with the angle, depth and bottom diameter given. In order that some reliable guide may be had by the operator, the large diameter should have been shown, as it is here that his cutting tool must enter the work. However, with the dimensions given, we are able to figure out quite closely the size of the large diameter. The diagram and formula are here given:



Therefore, the large diameter would be 12.368 inches, or close to 12⅜ inches.

THE ELECTRIC FURNACE

Sheffield Industrial Progress During the War

An interesting discussion on the electric furnace, bearing partly on the progress made in Sheffield in the use of this method of steel melting, took place at the inaugural meeting of the Sheffield sub-centre of the Institution of Electrical Engineers, which was held last night at the Royal Victoria Hotel. The institution has recently adopted the plan of sub-dividing its organization, and the advantages of this method were explained to the meeting by the president (Mr. C. H. Wordingham, of London). The excellent attendance at the meeting was an augury for the success of the new sub-centre. Mr. R. H. Campion, of Dewsbury, presided.

Four papers were presented: "The Booth-Hall electric furnace," by Mr. W. K. Booth; "Electric furnaces in the United Kingdom, 1918," by Mr. R. G. Mercer, of the Ministry of Munitions; "A new type of electric furnace," by Mr. A. Sahlin; and "Large electric steel-melting furnaces," by Mr. Victor Stobie.

Mr. S. E. Fedden (general manager of the Sheffield Corporation electricity department) gave an interesting resume of the growth of the use of electric furnaces in Sheffield. He said that in 1882 Sir William Siemens melted 20 pounds of steel, and thought he had done a very great thing. In 1902, pig and scrap iron were made into steel on a commercial basis. The man from Sheffield, however, was very canny, and he took some time before he would even try the experiment. The first firm who ventured to do so on any large scale were Edgar Allen and Co., who put in a single-phase furnace; and shortly afterwards Messrs. Thomas Firth and Sons put one in. These were run by motor generators, and gave very little trouble. In 1910 an Electro-Metal furnace was put in. It was two-phase, off transformers direct. They had a lot of trouble with that, but it was overcome, and then they went forward fairly well.

In 1914 they put in one furnace; in 1915, three (one of which was the first war furnace); in 1916, 11 furnaces, taking 13,000 kilowatts; in 1917, 18 furnaces, taking 14,000 kilowatts; and in 1918, seven furnaces; so that altogether they connected up, in a very short period, furnaces taking an output of no less than 35,400 kilowatts. They had the ordinary load in addition, and in three years the units sold grew from 26 millions to 172 millions, and the maximum load from 14,000 to 57,000 kilowatts. They connected up more furnaces than they had safe carrying capacity for. They had to do so on account of the war. They obtained from the Ministry a permit to put down a special telephone system, and got in connection with all the furnaces; so that, if they got a very bad run of coal or were short of plant, they could immediately ask that the units going into the furnaces should be reduced until they were able to give a full supply again. This arrangement was of very great assistance and enabled them to take on more furnaces than they really ought to have done.

Mr. Fedden analyzed some figures of output given in Mr. Mercer's paper, arriving at the conclusion that the steel manufacturers' load factor was only 15 per cent. He said if they asked anybody else what they ought to pay for a 15 per cent. load factor, they would be given a figure of 3d. to 3½d. Yet the Sheffield Corporation, at which they were always shouting on the score of high prices, had been giving it them for 6d., and practically losing 3d. a unit, for the benefit of steel-making in Sheffield. (Laughter).

Mr. Ernest Wells, of Edgar Allen and Co., said when he went to the Ministry of Munitions electric furnaces were very much over-rated. People were selling them on the principle on which one sold a pup. They were sold on the terms that anyone who bought them, no matter what business they were engaged in, could make good steel castings with them. But the output of good steel castings from the electric furnace until quite late in the war was negligible. The big bulk of castings were produced from the Siemens furnace or the side-blown converter. However, his own firm had sufficient confidence to have ordered some electric furnaces, and were going to make a shot at producing castings from them.

Mr. Travis (Sheffield) took exception to Mr. Wells' statement. He said he thought all manufacturers resented Mr. Wells' action at the Ministry. The fact was that people who had stock converters or other methods of making castings in their works, and who installed electric furnaces, had shut down their other plant and carried on the electric furnaces, which proved conclusively that the electric furnace gave them the result they required at the lowest cost. The very fact that Messrs. Edgar Allen and Co. had installed two electric furnaces, which he understood were ordered just before the armistice, showed their belief in the furnace which Mr. Wells attempted to damn to everyone else.

Mr. C. H. Rose (representing Mr. Victor Stobie), said his firm did not attempt to sell a furnace until after three years' successful manufacture of steel.

Mr. Howard (Sheffield Corporation), expressed the opinion that in many of the older furnaces the voltage was far too low. It ought to be increased by 25 per cent. This would lead to a considerable reduction in cost.

The Drawbridge, Up-to-date, in Industry

The Castle Moat of Former Years and the DrawBridge Over it Have Their Counterpart in Modern Industry Where at Times it is Necessary to Make Provision for Two Streams of Traffic on Different Levels

By J. H. Moore.

THE problem of conveying material from one department to another, throughout a large plant especially, is one well worthy of special consideration. A correct solution to such a problem may mean an enormous saving, while a hasty and not properly thought-out plan may mean, in fact usually means, a decided loss.

It often happens that two buildings are rather widely separated either by a street, railroad tracks, or other causes. Where a street intervenes there are as a general rule only two solutions to be considered, namely, the overhead bridge, or the underground tunnel. It depends, of course, on the general layout of the plant, which of the two policies is adopted.

In a case where railroad tracks come between buildings, the overhead bridge is as a general rule the solution adopted, but this idea, while a very efficient one, is also a costly undertaking. This is especially true if the cars which run on these sidings are only in place perhaps once a week, and in some cases even at longer intervening lapses of time than the former time stated. One cannot blame a manufacturer in such circumstance from saying, "The cost is quite an item."

They say that there is always a solution to any problem if you'll only keep on looking for it, but be that as it may, we have at least come across the solution to the problem we have just been discussing.

DRAWBRIDGE PARTIALLY RAISED.

At the plant of the American Can Co., Hamilton, Canada, the writer noticed a novel counterweighted bridge, which in reality is a commercialized idea of the old bastile bridge of former days. Of course, you remember your history of how these bridges spanned the moat around the fortress, and could be lifted up at will.

The same idea holds good in this case, but in place of the moat we have our railroad tracks. Fig. 1 illustrates how the bridge appears when down in place. It spans from one building to a shipping platform constructed alongside of the other building, and is operated by means of an ordinary rope.

When in position the bridge is held in place by means of a strong pin, which goes through a suitable flange on the bridge. Fig. 2 illustrates the bridge partly up. We photographed it from this position purposely, to show the counterweight space A. Readers will note that the construction is structural steel, with wooden running face. The bridge is built to stand up under heavy usage.

One would be surprised to find how easily this bridge operates. As soon as catch is released it swings up easily and smoothly. Of course, it keeps going up until it touches the building wall, if necessary.

Manufacturers will do well to study their transportation problem afresh, and see if a bridge of such style could not be used to advantage in their particular case.

DRAWBRIDGE DOWN AND IN USE.

Solving the Problem of Why is a Hot Box

The Discussion on a Paper Read Before the Canadian Railway Club of Montreal. The Paper Was Printed in Last Week's Issue

"I DO not agree with the statement made that we are farther away from the solution of this matter than we were twenty years ago, as I know that twenty-five years ago it was a common thing to see a freight train with two or three boxes smoking and others on fire, but you do not see this now.

"I have been wondering if anyone was going to say anything on what I consider to be the vital point in the whole matter. We have heard about the wearing of the white metal lining down to the brass and the serious results which follow. Now, in my belief, this is purely a question of magnetism, but if you talk to the ordinary car inspector about magnetism, you might as well talk to him about the number of feathers in an angel's wing.

"There are some metals that have the same magnetic conductivity, but there are no two metals or combination of metals that have exactly the same conductivity and when you get the bearings worn down and allow the two metals to come together in an infinitesimal, microscopical sort of a way, still they are big enough to cause a lot of trouble. In my opinion this is one of the largest elements in the whole thing.

"In so far as end wear is concerned in examining journals you will find that in turning them up they are carefully chamfered off at the end of the collar outside, but the inside is left perfectly square and the result is that we have a lot of them that are not circular getting into service.

"Some time ago I suggested that this method be changed and the inside corner of the collar be chamfered slightly the same as the outside and whenever this plan has been adopted it has saved an immense amount of trouble, particularly on new equipment. This, and the question of magnetism, are really bigger than most people think.

"I remember a case of some years ago where a big manufacturing plant required 500 coal cars for their own use. When they came to make the car brasses they picked up all the old scrap brass they could find about the place and put it in the mixer. Of course, the product looked like car brasses, but when the cars were turned out they did not run 200 miles light before they had to be re-brassed. The general manager sent for me and I put some of these brasses under the steam hammer and broke them through the centre and I found that they were more or less full of steel filings, borings and lathe chips. Apparently they did not take care enough in running their magnet through this stuff to pick out the steel and iron refuse before it was melted. When the brasses were replaced with the proper mixture the trouble disappeared immediately.

"If proper attention is given by the builders and the railway people there will not be so very much trouble with hot boxes. I do not know just what the figures are, but I am sure that the proportion of hot boxes now is not one-tenth of what it was twenty-five years ago. I would not like to think that the work of the Galena Oil men and the railway people has all been expended in vain in the last twenty or twenty-five years."

Norman Holland, president of the Holland Varnish Co., spoke briefly on the influence of the magnetic action, and the analyses of the metals in the journal bearings. In speaking further, he said:

"Mr. Gesner has brought up the question of the metals used in connection with the journals. He has referred to the electrical relations of these metals to each other. This question of the electro-positive and electro-negative relations of the various metals undoubtedly has some bearing on the question of journal troubles. The influence exerted may not be very great, but it is still quite sufficient to enter into the matter.

"I wonder to what extent the railways check up the analyses of the various bearing metals they buy? Do they know they are getting a composition that will stand the enormous stresses put on a journal bearing? Do they know what proportion of tin they get in relation to the lead used? We all know that owing to the high price of tin the tendency of the babbitt manufacturers is to increase the lead content as much as possible. These are most important points.

"There is no doubt but what the question of hot boxes can be solved to a large extent if the railways will give the matter the proper attention. Mr. McVeigh has pointed out a number of ways in which the matter could be helped. We have a factory in which we use nothing but double ball bearings. These require attention only once a year. They have now been running for nearly ten years and have never given us any trouble. Has any railway ever tried the ball or roller bearing and would it be possible to use either of these in railway equipment?"

Roller bearings had been tried out some time ago on trains of the C.P.R., but Mr. Smart stated that these had to be removed during the winter months, and, so far, had not been found successful for railroad service.

The question of cost was touched on by B. C. Gesner, who stated that the cost of journal lubrication had been reduced approximately, from 28 cents per thousand miles, on freight cars, twenty years ago, to about 4½ cents per thousand miles at the present time.

In closing the discussion the comment of G. M. Wilson, motive power superintendent at the Point St. Charles shops of the G.T.R., emphasized the importance of careful workmanship and supervision in the machine shop before the axles or the brasses were placed in the truck or engine. He said in part:

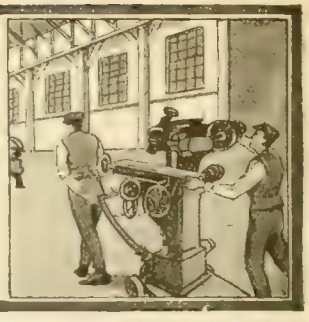
"I can say the remarks made by Mr. Booth that shop practice has something to do with the heating of journals brought to mind a case that quite recently came under my personal observation. We turned an engine out of the shop to make its customary trial run across Victoria Bridge, but before it had gone very far one of the tender journals ran hot. The wheels were removed for inspection of the journal and to all appearance it was parallel and smooth. I had it properly cleaned for further inspection and upon pressing with my finger and thumb and running them around the journal, I discovered that slight regularly space corrugations bounded its circumference.

"Either the undrilled centre bottom in that journal, or a chattering axle lathe bearing, or a combination of both, together with careless inspection, certainly caused that hot box.

"I came to the conclusion that, so to speak, if a journal is perfectly round, perfectly parallel, perfectly smooth, and perfectly lubricated, it will never run hot."

There has been considerable discussion during the past year or two concerning the utilization of Para rubber seed for oil, and it is stated that already exhaustive experiments have been made along this line. It is cited that in one instance oil from rubber seed was sold at about $250 a ton at a time when the price for linseed oil stood at $300. Experts are of the opinion that this oil could probably be successfully used in the manufacture of paints and varnishes, linoleums, soft soap, rubber substitutes, etc. In addition to the use of rubber seed for the purpose above mentioned, it is stated that experiments conducted in the Strait Settlements have clearly shown that a feeding cake for cattle and other stock, favorably comparing with linseed and other oil cake, can be produced from the residue of the Para rubber seed, after the oil is extracted, thus affording an opportunity for the development to very considerable proportions of a profitable industry in connection with the ordinary oil extraction.

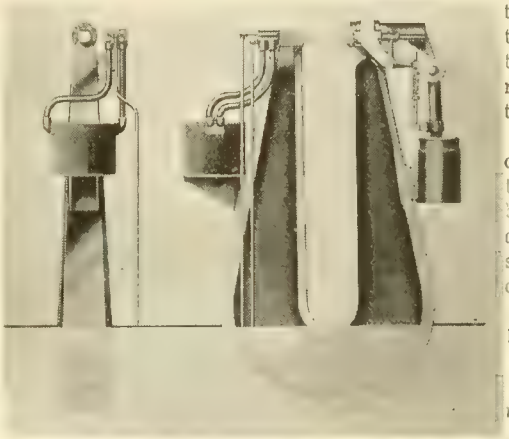
DEVELOPMENTS IN SHOP EQUIPMENT



ELECTRIC RIVET FORGE

An electrical heating device for rivets, which is capable of wide application to shipbuilding boiler making and the erection and fabrication of structural steel, has been developed by the United States Electric Co., New London, Conn. The accompanying illustrations show various applications of the device. In its essentials, as shown on the portable rivet forge, it consists of a source of low potential current, a water-cooled and movable upper bridging electrode and two lower electrodes or terminal blocks. Rivets are heated in pairs and on being placed between the two-current carrying electrodes are quickly raised to a riveting heat without the formation of scale.

The forge can heat rivets of ¼ in. to 1¼ in. diameter. On two recent tests two ¾ in. rivets with 2½ in. shanks were heated in 15 seconds; two ⅞ in. rivets with 2½ in. shanks in 23 seconds, and two 1 in. rivets, with 2½ in. shanks in 30 seconds.



ELECTRIC RIVET HEATER ATTACHED TO BULL RIVETER

The following is a test made at Springfield, Mass., October 3, 1919, at the plant of American Electric Service Company:

Test, 50 rivets; total cost, 9 cents; time, ½ hour.

Size of Rivets.	Heating two at a time	Volts (Transformers)	Amperes (Transformers)	Volts (Current)	Amperes (Current)
1 inch ...	25 sec.	5¼	5500	220	190
⅞ inch	18 sec	4¼	5000	220	175
¾ inch .	14 sec.	4¼	5000	220	162
⅝ inch . .	9 sec.	3¼	5000	220	150

From the construction and principle of the device it is necessary to heat two rivets at once. This is a decided advantage, as the two are heated in the time taken to heat one.

One of the illustrations shows the machine adapted to the bull or gap riveters. The rivets are placed in the rivet holes cold, and the work to be riveted is moved along in front of the electrodes, which may be brought in contact with the electrodes either by the motion of the plunger or by a hand lever.

One rivet is being preheated while the other is being brought to the proper heat. By this means a continuous line of hot rivets is kept on the way to the plunger of the gap riveter during the operation.

In the case of portable riveting machines the device is designed for use with rivets not over 5-8 inch in diameter. It is made to operate in conjunction with the pneumatic hammer.

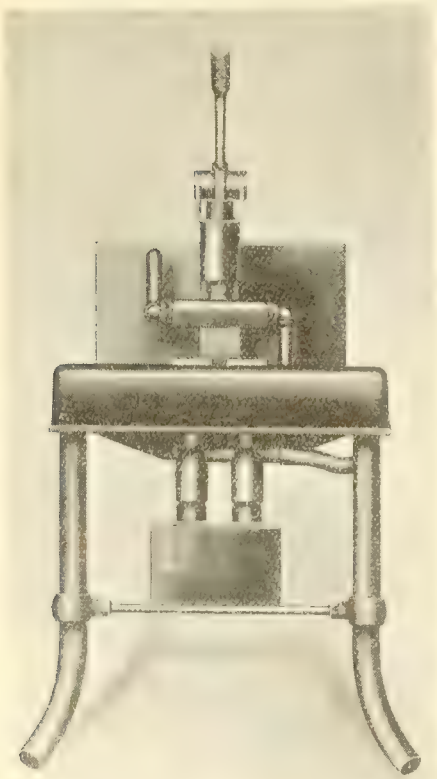
The operation is rather simple, the tool being attached to either the riveting hammer or the holder-on. Cold rivets are placed in holes shaped to size, the holder-on comes in contact with the rivet as in an ordinary case, but here the electrode is brought in contact with the head of the rivet. Heat is maintained until the desired intensity is reached, then the rivet is headed by turning the air gun around.

The electrode is attached to the side of the riveting gun, allowing two rivets to be heated at once by the use of a bridging conductor, which makes the device useful in heading rivets from one side of a plate, the outside of a boiler or in restricted spaces. Equipments are available in all sizes and for use with 110-volt and 220-volt currents.

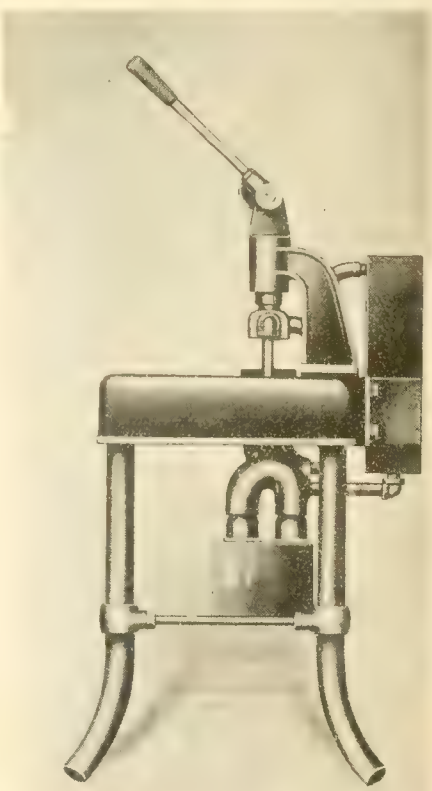
The forge type of rivet heater was designed and built to meet the requirements of shipbuilders, structural steel builders and boiler manufacturers wherever it is necessary to use hot rivets from ¾ in. to 1¼ in. diameter, 3 in. shank; the time for heating being from seven to fifteen seconds, and at a very low cost.

The electrodes are arranged to heat two rivets at one time, delivering four 1 in. rivets per minute, which is as fast

(Continued on next page)



PORTABLE ELECTRIC RIVETER, FRONT VIEW



PORTABLE ELECTRIC RIVETER, SIDE VIEW.

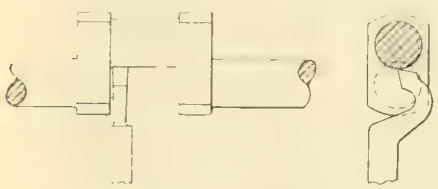
WHAT OUR READERS THINK AND DO

PARTING TOOL DISCUSSION

I have followed the discussion on parting tools with interest and profit. I think it is a good thing to have an exchange of ideas, and I hope these discussions on different topics will become a feature of CANADIAN MACHINERY.

No fair comparison can be made of the relative merits of forged tools and inserted tools, that is small tools held by a tool holder, unless each particular job is taken on its own merits.

For ordinary shop work the inserted tool is most popular and cheapest. We



PARTING TOOL DISCUSSION

learned something about parting tools during the war as Canadian machine shops cut off thousands of shells, and I venture to say that very few, if any, forged tools were used. During the war some steel makers made a special steel for cutting-off tools; this special steel was made in bars with the sides clearance on, so that all that was then necessary was to mill or shape a holder to fit the cutting-off blade which could be used up until it was tool short; all it needed was to grind the front and top clearances.

There are quite a number of other factors beside the shape and style of tools to consider in successful parting operations. The most important is the personal element. The lathe hand or operator, as we all know, given exactly identical conditions, some men will be much more successful than others.

Then there is the cutting speed, the cutting compound (if any), the material, the diameter of the job, and the rigidity with which it is held. To have a piece of work sticking out of the chuck too far always invites disaster.

The width of the tool always needs some consideration, as a rule the smaller the diameter of the job the narrower the tool that is within reasonable limits. The height of the tool in relation to the centre of the work also varies with the nature and diameter of the work.

If you get the tool below the centre of a light, spongy job the job is apt to climb over the tool; if you get it much above the centre you have to have an excessive front clearance to make it cut at all, then the first thing you know the tool will dig into the work and throw it out of the centres.

I have found that in using a parting tool on large diameters it is best to set the tool slightly above the centre, and on small work at the exact centre.

Another point is to maintain a continuous and even feed; it is not often that the cross feed can be used for cutting-off operations, they are generally too fast. To let the tool stop cutting seems to harden or gloss over the surface besides dulling the tool, so that it requires extra pressure to make the tool cut again, often with disastrous results.

ELECTRIC RIVET FORGE

(Continued from page 492)

as they are required. The rivets are brought to the proper heat entirely free from scale, and are passed on to the riveter.

The pan of the forge is designed to hold a keg of rivets in front of the operator or heater, and the rivets are easily placed by hand in the electrodes, and removed with the tongs when heated.

The operation is very simple, the conductor being operated either by foot or hand lever, bringing the electrode in contact with the point of the rivet or rivets to be heated, pressing down on the lever, and, when the desired heat is reached, the conductor goes back by removing the pressure on the lever. This method of heating rivets eliminates the following:

Loss of time in starting forges in the morning and at noon time.

Loss of burned rivets.

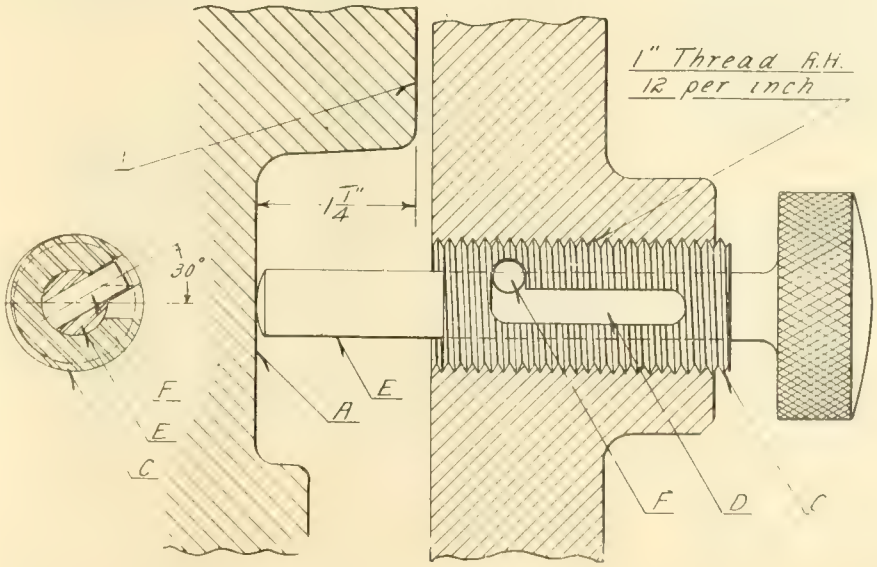
Breaking and carrying of coke and fuel for forges.

Air hose and air where same is used to blow up the fires, fittings, etc.

Smoke and gases in close compartments on ships, boilers, etc.

JIGS AND FIXTURES

Application of the Bayonet Lock



The accompanying sketch shows a practical application of the bayonet lock, adapted to a jig or fixture where ordinarily a long, clamping screw would be necessary. When the work is being removed or placed in position the pin F is at the right end of the longitudinal slot D, the central rod E being drawn back to allow the lug B to pass. To clamp the work, the rod E is pushed forward and the pin engages in the short radial portion of the slot, and the threaded bush C is turned in the usual manner.

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Are You a Figure Fiend?

AT an early stage in our lives, most of us, possessed of any imagination whatever, wondered just how much we saved by cutting across lots instead of going around. A little later on another problem intrigued us; we wondered as to just what the relation between the diameter and circumference of a circle was. Fortunately, we had teachers, more or less accomplished, to enlighten us, but in the early stages of the development of mathematics and general science those of a philosophic mind were not so happily situated and perforce, they had to go it blind.

All problems having to do with the mensuration of the circle have to do with the ratio of the circumference to the diameter. To those not conversant with mathematics, it would appear that this should be comparatively simple and so it is of no absolute value required. The ratio commonly denoted as π is in its nature an incommensurable number, that is no fraction can be found which will give its exact value. The commonly accepted approximation of 22/7 is not strictly accurate, for when it is changed into a decimal fraction its value will be 3.142857°, whereas the true value to the same number of decimal places is 3.141592. A closer approximation than the fraction 22/7 is given by another fraction 355/113.

Perhaps the best proof of the fact that no vulgar fraction can be found which exactly represents the value of π is seen in a characteristic of all vulgar fractions. When reduced to decimals it will be found that after a certain number of divisions they repeat themselves thus: 22/7= 3.142857,142857, etc. On the other hand, the number π never repeats, but runs on and on as far as one cares to figure it.

The earliest idea of the number which represented the ratio between the diameter and circumference was probably the number 3. It was so at least among the Jews (1 Kings vii:23, 26), the Babylonians, the Chinese and probably also the Greeks. Archimedes made a notable advance over former knowledge of this subject, and by geometrical means which he originated determined the fact that the true ratio lay between 3 1/7 and 310/71. His method consisted essentially of calculating the length of the sides of regular polygons inscribed in and escribed around the circle.

With the renaissance in Europe more powerful means became available and the use of formulae, in themselves an algebraic shorthand, greatly simplified the labor involved in computation. One Rudolph Van Ceulen (d. 1610), busied himself with the problem for the greater portion of his life and the results of his labors were not interred with him but inscribed on his tomb. He gave the result correct to 20 decimal places and as a curiosity it may be given here:

π=3.141,592,653,589,793,238,462,643,383,279,502,88.

Since his time has arisen a class of workers known as π-hunters, π-cumputers, or circle squarers. Their labors, fruitless though they may be, are interesting from the length to which they have carried the number. A decimal number with several hundred places is common in their results and one figure of 707 places has been reached. When compared with the modest figure given above, this number seems enormous.

Various methods have been used by these investigators for the solving of their problem and much effort has been wasted by some of them in trying to reach the end of their never-ending labors. It has been definitely proved that no such end is possible, and we must be content with approximations, of whatever degree of exactness desired.

Deliveries From the Steel Mills

THE steel companies in United States are having a better time, as far as their dealings with their customers are concerned, than they will when the strike is finally settled. At present buyers are making every allowance because they know what the mills are up against. They are taking any delivery they can get and they are not complaining.

When the announcement comes out that the strike is off, the public will expect immediate recovery from the mills, and they will not be complacent with delivery schedules that are weeks and months behind.

The matter of immediate recovery after a plant has been tied up or fifty per cent. crippled is easier said than done. A steel mill is a great organization, and it is easily thrown out of gear. Capacity production depends upon men being skilled and acquainted with every successive operation.

A strike in a coal mine or a strike in a steel mill soon brings about a state where it is a hard matter to recover quickly.

Unless all signs fail the steel mills, at the close of the strike, will bump into that fickle side of human nature that prefers performance to excuses, and shipments to explanations.

The Use of Weapons

THE number of cases where it has been shown that persons had loaded weapons in their possession seems to increase in Canada. It seems to be the proper thing now to shoot if things don't go to suit you.

After every shooting there is a campaign to stop foreigners from carrying weapons. There are regulations, no doubt, to cover all this, but the fact remains that carrying weapons is a common practice.

A man who carries a loaded gun in his pocket does so because he thinks he will be called upon to use it. There are mighty few men called upon to do any shooting as long as they are minding their own business. The man who carries a gun reckons that he is going to break the law and will need a show of force to do it.

At the present time it is too easy to obtain or keep revolvers. If a man wants to fight, let the law see to it that he comes out in the open with his fists, rather than skulking up some dark lane with a loaded gun.

The State of the Market

IN CANADIAN MACHINERY of August 22, 1918, there appeared an article written by one of the associate editors of this paper on the prospects for machine tool trade following the war. The article is headed: "Should Be No Post-War Slump in Machine Tools." The heading gives a general outline of what the article had to say. It reasoned that the war machine would not come into competition with the general purpose tool, and that much of the material, from long and hard usage, was fit only for the scrap. The fact was also brought out that many firms had dropped usual lines, and large organizations built up for war purposes would be held together to turn to new lines.

It is worthy of note that every one of these predictions has turned out to be true, and it is also worth remembering that toward the end of 1918 the pessimist was abroad in the land. He was saying that 85 per cent. of the business passing was war work, and that was going to be cut off all of a sudden, and the labor market glutted.

That period of readjustment that was going to be such a nightmare, is well under way, and the blue ruin element has not yet entered into the consideration.

There is more business moving than an unthinking or a non-observant man realizes.

Business has remained good in spite of tinkering. Too much tinkering and too much non-production are things we have to guard against. They can wreck our prosperity and batter down our progress more certainly than any other element.

Are You Wasting Your Time?

NOW that the winter months are almost here, what are you doing in the long winter evenings? You say you get enough of the grind all day without continuing it at night. Quite right. But did you ever stop to think that the way to get away from the grind was to grind harder?

The manner in which manufacturing is carried on now, the speed with which operations must be performed, the way in which material must be routed, all mean that the man who is going to master the situation must be a student. What was considered a job for a standard machine yesterday is moved to a special-purpose tool to-day.

What do you read? The papers? Very well, read them. Keep informed, but make certain that your information is going to be worth something to you. You read three columns of stuff about the gruesome details of a murder or a suicide or a divorce case. What better off are you? Absolutely none.

Get a direct drive in your reading. Make it a point to be well informed about some subject. People find it a pleasure to talk to you. There are successful men on the road who do this thing continuously. They enter into a conversation and turn it to a subject on which they have gathered a lot of information. They are able to talk intelligently and they get a good hearing.

You can do the same thing in your own line, no matter what it is.

You can largely make yourself what you want to be.

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14 THE LITERARY DIGEST FOR OCTOBER 25, 1919

lowed throughout the country, would lead to the bloodiest upheaval in all history, an upheaval in which they would be the first to pay the last price that men can pay for social sins.

"It is a striking fact that it is the 'radical' unions and Socialist organizations, together with some 'liberal' magazines, which today stand almost alone in defense of intelligent and civilized methods of dealing with the problems of the hour. Instead of abolishing the restrictions on free assemblage and discussions, instead of allowing the masses to express their wishes and wants through organized effort,

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THE FLAW!

----Cassel in the Cincinnati Commercial Tribune

refuge is sought in terrorism, illegal suppression and organized violence. The reaction is losing its head -- and the New York "Commercial." Against the "red" campaign of evil "there must be organized one of devotion and patriism," declares the Los Angeles "Times," which goes on to say:

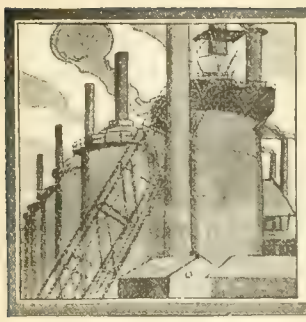
"We must set backfires of intelligence and patriotism. Thrift and industry must combine to fight their own battles. Against the forces of confiscation must be arrayed those of production. They of small incomes and small holdings, humble homes and small bank accounts, must not expect the so-called wealthy classes to fight for them. For not one person in a thousand is in the capitalist class, while half the producers of the country own something which the Reds through their machinations are seeking to confiscate. If anarchy were to prevail for a time, it is the persons of small incomes and the owners of single holdings who would suffer most. The very rich would be able to step across some convenient national boundary where their personal comfort would not be seriously affected. But the ones who would be hit hardest are those who have acquired through industry and thrift a small competence, a little home, a nest egg in the savings bank, who would see the savings of a lifetime swallowed in a whirlpool of Bolshevism--these would pay the penalty of their thrift and industry, while the bestial and criminally inclined would hold high carnival.

"It is during crises like the present that great civilizations in the past have disappeared."

EFFECTS OF THE PRINTERS' STRIKE

THE AGONIZING MENTAL SUSPENCE which magazine readers in general, and serial novel readers in particular, must suffer because of the printers' strike in New York, is pityingly commented upon by a facetious editorial writer, who regrets that the hero will be locked in a death grapple with the villain, while the beautiful Sylvia looks on, for several weeks longer than usual; the brave and unsophisticated country girl, battling with the vicissitudes of life in the great and wicked city, will still be undecided as to whether she should marry the rich clubman and be assured of a life of leisure. And so forth.

PART OF PAGE SHOWING HOW NEW YORK MAGAZINES GET OUT IN STRIKE TIMES.



MARKET DEVELOPMENTS

Some Canadian Firms Have Anxious Times

Hard Matter to Secure the Material They Need—Varying Reports as to the Deliveries Reaching This Country—Machine Tool Market is Brisk

MATTERS are becoming serious for some Canadian concerns which draw their raw material from the United States steel mills. There are various reports in regard to deliveries, and the best of them do not claim much over fifty or sixty per cent., while in other cases the mark is at zero. One large Toronto firm of importers and jobbers stated this week that for the first time in their history they could not find a mill in United States that would take on business for future delivery. Mills that have managed to stay open and operate even on a reduced basis have been swamped with business that will keep them covered for months to come. They become so hopelessly over-booked that their only course is to withdraw from the market for the time being.

There will be a tremendous amount of business piled up against the day when the mills state they are open to take on orders again. Some speculation is indulged in as to whether prices will stay or advance under such conditions. In some ways the war period is being repeated, in that there is a tremendous demand and a limited supply, and without Government control it is easy to see where prices may get a start. Against this it is pointed out that under the present schedule the steel companies are showing good earnings, and any move toward a higher scale would only serve to arouse the agitation of labor leaders for a share of the higher prices. The latter view of the fact seems to be the more likely one. However, there is nothing to hinder prices of material rising after they leave the mills. At present sales are not made on schedules, but on the urgency of the case. Many times it is delivery that is paid for as well as the material. Both plates and sheets were marked up this week.

The machine tool market is very active, and the big problem is the securing of shipments. Rebuilt war machinery is having a good innings in the market now, due to quick shipment and lower prices. One firm keeps a large shop busy rebuilding, and the tools are taken up almost as rapidly as they leave the rebuilding plant.

The scrap metal market is anchored fore and aft at present, and shows little sign of betterment. Speculators who bought in Canada some time ago for resale in United States later are having an anxious time just now, and losses are imminent.

MONTREAL IS ANXIOUS TO SEE THE END OF U.S. LABOR TROUBLES

Special to CANADIAN MACHINERY.

MONTREAL, Nov. 13.—The local situation has developed few changes during the past week or so, but the continued labor difficulties in the States that have resulted in reduced production and increased transportation troubles are beginning to be felt here in the delayed delivery incidental to strikes of this character. The inauguration of the coal miners' strike has been the cause of more concern, in local circles, than the walk out of the steel workers, as the latter was confined to fewer industries than would be affected by a general curtailment of coal supply. However, no serious condition has yet arisen here, but dealers and manufacturers are watching American developments very closely, as the next few days will decide the question one way or another. In some respects the Canadian mills have benefited to the extent that calls upon their lines have been somewhat heavier than formerly, and the volume of business placed reflects the inability to obtain similar products from American sources, within a reasonable time. The general demand for industrial finished steel, however, is not excessive at the present time, and with a few exceptions, the pressure of United States strikes has not been seriously felt in this locality. Navigation is gradually showing the near approach of the closing season, as fewer vessels are coming to the port, but it is expected that official closing will be as late or even later than last year. General business activity continues brisk, more particularly where this is not dependent on American supplies. The movement of machine tools is of fair proportions and would be more so but for the difficulties that surround the shipping and transportation of equipment. The metal market is nominal in ingot business, but finished lines are very quiet, as a result of the impossibility of obtaining supplies. Warehouses are virtually out of sheets, and no galvanized line can be secured. What little comes through is immediately transferred to previous buyers. Old material dealers are listlessly waiting a revision of industrial conditions in the States and few look for better conditions until affairs are more settled.

Sheets Hard to Get

Ingot metals are comparatively hard to get at present and the volume of sales are well distributed in small lots and in no instance are consumers buying very far ahead, content to purchase for immediate needs only. The difficulty at the moment is the securing of requirements for finished products, sheets are almost impossible to get and warehouses are completely stripped, with no definite knowledge as to when a supply can be obtained. Under these conditions dealers are content to let quotations stand as they are, as present prices can only be considered nominal, every sale being made on its own individual merits. Prices quoted, however, are a fair average of the present market. In lead sheets, local dealers are quoting an advance of 50 cents per hundred lbs., the lighter sizes selling for $10.75 and the heavier sizes for $10.25 per hundred lbs., with the usual charge for cut sheets.

Delivery the Problem

The outstanding feature of the ma-

chine tool operations for the week is the difficulty and the uncertainty associated with delivery of equipment from the United States manufacturers. This condition is the one that probably impresses a person here as to the growing seriousness of the strikes in the States, factors that prevent or interfere with the regular schedules of production of machinery and ultimate delivery. During the past week the revival of inquiry for used equipment has reflected the inability to secure new tools for early delivery. Dealers state that they could materially increase their sales if they could give some definite assurance of date of shipment. Many customers, realizing the conditions that exist, are satisfied to place their orders and rely on the dealer to get the tools through as soon as possible.

Local Movement Only

The combination of circumstances has resulted in a very inactive scrap market. The present trade is largely local in character, and the requirements are generally for small supplies delivered regularly, few consumers acquiring stock for future needs. As a result of the recent strikes in the States the shipments of scrap to American mills is approximately nil, and this condition will probably continue while industry is so unsettled. The critical point will be reached before this goes to print and subsequent activity will depend on the attitude of the Government and the miners' organization. Sales are based on prevailing conditions and prices quoted are only nominal, but a fair average of what the dealers are willing to pay.

POINTS IN WEEK'S MARKETING NOTES

The Willys Corporation at Elizabeth, N. J., are planning to get an organization together for an output of 500 cars daily.

Shipments of plate, sheets, etc., from the U. S. mills do not improve and Canadian manufacturers are having trouble in getting enough material to keep their plants going.

The scrap market is more or less stagnant. Speculators who bought in Canada a short time ago to sell in U. S., have not made money. They have lost on their speculation.

Some steel offices in this district can now show a fifty per cent. or slightly better delivery schedule.

Rebuilt machinery in the market now is moving out quickly.

The coal strike, according to Pittsburgh, is not going to help the steel strike, as the steel mills have big supplies on hand.

It is estimated that the steel strike has cost the mills now an entire month's production.

Prices of pig iron are advancing sharply. None of the producers seem to care to take a definite lead in boosting prices, but are quite content to trail along and sell at increased prices.

STEEL SHORTAGE IS MORE ACUTE

Shipments Do Not Improve—Demand for Machine Tools is Still Strong and Increasing

TORONTO.—Unless the reported improvement at the steel plants soon finds a sequel in decidedly improved shipments coming to Canada, there are firms that will have to shut off certain of their departments. That is not a matter of speculation, but an absolute fact. The supply of steel from the mills on the other side is still well down, as against a demand that is increasing rapidly.

The Sale of Machinery

The representative of CANADIAN MACHINERY noticed a nice line of lathes and shapers on the floor of one of the Toronto showrooms, and inquired how it was that they managed to keep that machine. The salesman merely pointed to a white chalk mark on the other side of the tool, which read "Sold." It could be sold a good many times over, for the demand for good machine tools is too keen for the available supply.

As showing the demand for machinery in Canada, the following can be given as an illustration: One firm took in a very large amount of used machinery of the better sort from the war shops. They scrapped any that had been used too roughly, and engaged a machine shop to go ahead and rebuild the remainder. It is coming out of that shop now at a pretty fair rate, but it has no chance to accumulate, as it passes out into use again about as quickly as it comes on the floor of the warehouse.

As noted some days ago in these columns there are firms that are losing business because they cannot give deliveries that meet the needs of the trade. A customer wants a two or three month delivery on a certain machine and it is no use to promise it. In many cases where houses act as exclusive agents they have nothing else to offer as a second choice. And, as is usually the case in a strong and rising market, the matter of price is not the consideration it used to be. Salesmen state that very seldom do they have to meet this argument seriously. Where a man or a firm really wants a machine tool, delivery is four-fifths of the business at present and it is delivery that the makers are uniformly weak on just now, with small signs of improvement.

Drew Another Blank

Several Toronto buyers and warehouses drew another blank from the expected shipments of steel from United States strike zone. A nice shipment of tubes came through to one of the firms, and the sizes showed that the mill is operating, as they were specials as well as standards. Dealers here state that operations of tube mills are about forty per cent., but there are others whose goods are held back yet who seem certain that thirty per cent. would be nearer the mark.

And in passing it might be noted that just at this season of the year there is a great demand for tubes, especially of the two and three inch sort. Repairs are being made to heating plants in schools, churches and other establishments, and strange as it may seem, many of the repairs always get shunted off until they are ready to light up the fires for the winter season. Prices have not been increased, although there is a feeling in the market that a higher price could be secured for tubes, but there is no disposition on the part of the big mills to alter prices owing to the strike, and so the jobbers have nothing to work from. They may secure some premiums, though, while the list remains the same.

A New Experience

But there is a shortage, and it is increasing, in regard to steel of all sorts. Here is the experience of one warehouse that operates on a large scale at several points in Canada: "In the last two months we have had a tremendous tonnage turned back on us by mills that we have been selling for years. They will not entertain the prospect even of taking on any business. We never had this happen in all our experience. It looks to us as though there would be a very large amount of business stacked up for the mills when they get down to production again. "The situation," our informant continues, "is very much the same as it was during the war. How then, do they calculate to hold prices for next year? Unless there is regulation, and that hardly appears likely, I believe the tendency will be upward in spite of the satisfactory earnings that steel companies are showing under present unsettled conditions."

Other dealers do not share this view. They point to the labor unrest that is existing at the moment in the steel industry of United States, and ask you what effect it would have to raise prices now. They answer their own question in the next breath by stating that it would simply mean that demands would be made for higher wages. These people contend that raising prices would be simply to renew all the agitation that has been gone through with for the past three or four months. The latter view of the case seems to have the better ground of being somewhat near to the real situation. For the present though, both plate and sheets have been marked up.

Some of the shops in this country are suffering already from the shortage of material. Stove makers feel the need for sheets already. Another firm making metallic furniture practically clean-

ed the automobile steel out of one warehouse to tide over the period of scarcity. It is only a temporary account, and staves off the day when material will be missing entirely.

"While they do not state so openly," remarked one dealer this morning, "the mills give us the impression that they are out of the market entirely until this strike is won. They never suggest a compromise, their attitude being win or break."

A Dull Scrap Market

There is almost no action at all in the scrap metal market. There are a few speculators who are looking for action to relieve them of their embarrassment. It has been, in some quarters, a favorite form of speculation to buy up quantities of scrap here and ship to United States, holding there for better values before releasing for sale. Shipments that went across the line some weeks ago are not going to make money. They are going to lose it.

There is very little business going on now, either between dealers and sellers or mills or other consumers. All the coppers are weak, in fact, almost stagnant. There are none of the white metals that are showing any particular strength in the present market.

WILLYS CORPORATION PLANS FOR AN OUTPUT OF FIVE HUNDRED PER DAY

Special to CANADIAN MACHINERY.

NEW YORK, Nov. 13.—Eastern machine tool builders are, almost without exception, comfortably well off as to business on their books. Some companies are losing orders because of inability to make fairly prompt deliveries. On some lines deliveries are from a month to three months off. Current business is fairly good, although there has been a slight falling off in inquiries during the past week, due, perhaps, to the uncertainties incident to the labor troubles.

The Magor Car Corporation, Passaic, N.J., is in the market for about 25 metal working machines, most plate punches, shears, radial drills and similar machines for car work. Five wood-working tools are also inquired for. Several of the big deals in the East which have been pending for some weeks may soon be closed. Most important of these is the list issued a few weeks ago by the New Departure Mfg. Co., Bristol, Conn., for several hundred tools. The Willys Corporation, Elizabeth, N.J., is about to let contracts for new manufacturing buildings and is interviewing many machine tool engineers in preparing a list of its tool requirements. As the output of the plant is eventually to be 500 or more automobiles a day a very large quantity of equipment will be purchased. The General Electric Co., Schenectady, N.Y., has taken no action at this writing on its recent list, totalling more than 100 tools, but is expected to place orders soon. This is only a part of the General Electric Co.'s requirements for the near future.

Another large prospective buyer is the Stevens-Duryea Co., Chicopee, Mass., which will re-engage in the automobile manufacturing business. The trade expects that a large list of equipment will soon be inquired for.

Crane builders are very actively competing for business, very often at the expense of prices. While several of the crane-building plants have fairly good order books, much of the business has been taken with very little profit. During the war several new crane companies came into existence, and the productive capacity of the country is now in excess of the need. The Midvale Steel and Ordnance Co. has placed an order for several cranes for its Cambria works at Johnstown, Pa., with the Alliance Machine Co., Alliance, Ohio, and the Morgan Engineering Co., Alliance, Ohio, has received an order for five cranes for a new steel rolling mill at Canton, Ohio.

COAL STRIKE NOT REGARDED AS DECIDING FACTOR IN STEEL STRUGGLE

Special to CANADIAN MACHINERY.

PITTSBURGH, Nov. 13.—The coal strike inaugurated Saturday, Nov. 1, found nearly all the steel mills with stocks of coal equal to from two to four weeks of consumption, and the Government distributing authorities determined to avoid, if at all possible, any idleness of steel mills on account of the coal strike since that might lend encouragement to the iron and steel strike. No immediate occasion was found for furnishing coal to steel mills. The railroads seemed to be moderately well supplied, so that some of the commandeered coal, involving all that was in transit, was available for distribution, and this has been given to public utilities, as having the first claim. The Connellsville region was not affected, its coal production, apart from that converted into coke in the region, amounting to several hundred tons a week. The strike did not affect other non-union regions either, and a few small union mines remained in operation, while after the first day of strike there were occasional instances of union miners returning to work.

Increasing Steel Production

At the end of last week, the seventh of the steel strike, production of steel was at the rate of nearly 70 per cent. of the rate just before the strike. Production during October averaged 60 per cent. or a shade less. At the height of the strike, the third or fourth day, production was down to about 50 per cent. of the pre-strike rate. As the strike is now waning rapidly it is important to remember that before the strike production was at considerably less than capacity. From the middle of May there had been a continued increase in production, but just before the strike production was still only between 80 and 85 per cent. of rated capacity. This restriction in output was due in part at least to scarcity of labor, though the manufacturers also held labor inefficiency responsible.

Up to date the restriction in steel production by the strike has amounted to about three weeks of production at the rate before the strike, hence at the lowest estimate the entire restriction is going to exceed a month's production. The great problem with steel manufacturers now is not the strike, which is disappearing with sufficient rapidity, but production after the strike, as in many mills working organizations have been greatly impaired in efficiency and it is likely to be a long time before everything is working smoothly again. During the strike the customers of steel mills are very sympathetic and accommodating, but after the strike they are likely to become more or less peremptory in their demands, probably having the viewpoint that with the strike over they ought to be getting better service than ever.

The Wheeling district is still closed practically tight, but operations are increasing at a fairly good rate in the Mahoning Valley. All the blast furnaces in the valley were closed, but now about one-third as many are operating as before the strike and steel production in the valley is up to 20 or 25 per cent. Three of the four large steel interests at Youngstown are now shipping some steel, while the fourth does not seem to be shipping any, although it is making some pig iron and steel ingots.

Pig Iron

Values of pig iron have stiffened sharply. In some districts there is regular trading, showing almost constantly advancing market prices. In the Pittsburgh Valley district there is relatively little trading and market prices are not strictly defined. The producers, in the main, are indisposed to sell, and all or most of them are holding back, evidently with the idea that as price advances are unpopular it is better to let somebody else put the market up, and then simply come in and sell at the market price. Buyers willingly pay sharp advances over the March 21 schedule for such small prompt lots as they must have, and while prompt iron does not usually make the market, if advanced prices for prompt become well established it may be found easy, later on, to sell for first quarter or first half at those prices.

Foundry iron was $26.75, valley, by the March 21 schedule. A fortnight ago it sold at $28.75 for first quarter, but lately there are no sales for next year. Prompt lots have brought up to $33, valley. Malleable was sold at $30, valley, to a customer, who wanted foundry, which the seller could not furnish, and the $30 price on the malleable was regarded as representing a concession. Basic, which was $25.75 by the March 21 schedule and has been in light demand lately, has sold at $29 for prompt. Prompt lots of Bessemer have sold successively at $28.50, $29 and $29.50, the March 21 price having been $27.95. As closely as the market can be quoted it stands as follows: Bessemer $28.50 to $29.50; basic, $28 to $29; malleable, $30 to $31; foundry, $30 to $33, all f.o.b. valley furnaces, freight to Pittsburgh being $1.40.

In the East there is a clear cut market, No. 2X foundry (2.25 to 2.75 per cent. silicon) being $34.10 to $35.10 delivered Philadelphia. Buffalo has sold little, but the market there seems to be $32 to $33 at furnace.

Furnaces claim their costs readily justify these price advances, but consumers are not convinced. However, it seems clear that the advance is not all to be attributed to the iron and steel strike, perhaps not even the major part of the advancing tendency. Pig iron was advancing somewhat before the strike, and the strike has not affected the merchant furnace production of pig iron nearly as much as it has the operation of steel mills with their blast furnaces. One factor in the pig iron market undoubtedly is that last spring and summer consumers were striving to reduce their stocks, and carried the process too far, as is usual in such cases. Furnaces blew out until production was below consumption, and then came the strike. That the strike is not in itself responsible for all of the present shortage in pig iron is shown by production reports, to the effect that production of pig iron by merchant furnaces was 90 per cent. as heavy in October as in August. The strike curtailment, however, was more than 10 per cent., being probably fully 25 per cent., production having been increased up to the time of the strike, September 22.

Steel Supplies

There is not as great a pinch in steel supplies as might have been expected in the circumstances. Many consumers are getting along fairly well, though probably near the end of their stocks by this time. In some instances the scarcity is acute. Nails are extremely scarce. In automobile manufacture the scarcest steel item is springs for upholstery, and next comes strip steel, bars and sheets following in turn.

The English Market.—If any firm with a specialty of almost any kind that they would like to sell in England, will communicate with Mr. Furniss Clarke, Room 63, 364 University St., Montreal, he can probably place the same for them.

U.S. SCRAP METAL

The scrap situation is stronger. The lack of pig iron is making cupola scrap sought after, and prices have advanced. Following are reports from various U.S. points:

Pittsburgh.—The deficiency in pig iron has boosted the price for cupola scrap. A sale of 500 tons was made at $28 delivered. Dealers are looking for $30 on this grade. A good market is looked for in steel making and other grades when the labor situation is more settled.

Boston.—There has been an active buying market during the week, and a general advance in price has been noted. Among the grades most in demand is No. 1 machinery. Turnings and foundry scrap have advanced, and cast iron borings have sold at $16.

New York.—Cast scrap and heavy melting both show renewed activity with enhanced prices. No 1 heavy cast is quoted $24 f.o.b. New York, and heavy melting at $15.75 to $16.50. No. 1 machinery has advanced $1.25.

Philadelphia.—A sale of 15,000 tons heavy melting to the Luken's Steel Co. at $20, delivered, has cleaned up all this grade obtainable. All other grades are in good demand, especially cast scrap, borings and turnings. Clean cast borings brought $18 delivered.

Cleveland.—While there is active enquiry, there is little trading going on. The tone is strong, but a settlement of the coal and steel strikes is necessary to get business moving.

PIG IRON TRADE

There is a general advance in the pig iron market. Spot iron is exceedingly difficult to obtain, and premiums are being willingly given to get it.

Following are reports from United States points:

Pittsburgh.—What little iron is available for shipment between now and the end of the year is quoted at $30, furnace for No. 2. Malleable is in good demand and 1,000 tons for first quarter was sold at close to $31 furnace. For first half 1920 one interest has booked 100,000 tons foundry iron, but no price is available as yet.

New York. — The scarcity of iron for prompt shipment, has boosted prices. The minimum for Eastern Pennsylvania iron, 2.25 to 2.75 silicon, is now $33, and Central Pennsylvania iron of the same grade has sold at $35. Low phosphorus has been looked for more eagerly, and coppering bearing iron brought $36 furnace. There is a little Virginia iron, 1.75 to 2.25 silicon, available for shipment during the next month, quoted at $31 furnace.

Boston.—There has been a wild rush after any iron that could be obtained for prompt shipment, and prices has been a secondary consideration. Iron in some cases advanced as much as $3 in a day, and found ready purchasers. Panic over the coal strike was the cause of this. Some re-sale iron has been offered at $39 to $40 delivered.

VERY HIGH PRICES ARE PAID AT SALES OF U.S. WAR MACHINERY

A CANADIAN, who is at present engaged in the machine-tool business in Philadelphia, writes to CANADIAN MACHINERY regarding the sales of used war tools that have been taking place.

These sales, he states, are part of the features which make the market hard to gauge, as most of the tools are bought by consumers (users in this case), thus taking trade away from the dealer and manufacturing concerns.

This feature makes it appear that the market is dull, yet the number of tools (and the prices they are bringing) put on the market by the Government, shows the market to be very active.

Most dealers were at the sales Thursday, and I think one or two machines only were bought by them. The dealers were out of the run as the tool users were bidding in competition with the dealers and went a whole lot higher than a dealer could afford to go and make profit. Some of the tools brought practically new and some over new prices.

It is one of the psychological effects on open auctions that the user will outbid, and this to the extent of paying excessive prices at an auction, the prices he would not even consider if he were in a machine showroom, without feeling in duty bound to call the nearest policeman to arrest the dealer for profiteering. The high prices of new tools is also boosting these sales. It is very hard now to talk to a man about new tools until he has tried everywhere around to find a used tool.

The particular sales to which reference is made here was at the plant of the Eddystone Rifle plant, which, during the war, was one of the best equipped rifle manufactories in the country, its production running as high as 7,000 rifles per day. Since the war it has been used as a storage plant, and various Government equipments from other plants have been shipped in.

This sale comprises the machinery and material from the Fox Gun Co., the equipment from the Bethlehem Loading Plant and about 500 machine tools from the Eddystone Rifle Plant itself, in all there being about 900 machine tools and ment of every description.

All sales were made f.o.b. cars at the plant.

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON

Grey forge, Pittsburgh	$27 15
Lake Superior, charcoal, Chicago	34 60
Standard low phos., Philadelphia	$38 00-40 00
Bessemer, Pittsburgh	29 35
Basic, Valley furnace	25 75
Toronto price:—	
Silicon..2.25% to 2.75%	$32.75 to $35.75

IRON AND STEEL

Per lb. to Large Buyers	Cents
Iron bars, base, Toronto	$ 4 25
Steel bars, base, Toronto	4 25
Steel bars, 2 in. to 4 in. base	5 50
Steel bars, 4 in. and larger base	6 00
Iron bars, base, Montreal	3 75
Steel bars, base, Montreal	3 75
Reinforcing bars, base	4 50
Steel hoops	5 50
Norway iron	11 00
Tire steel	5 50
Spring steel	8 00
Brand steel, No. 10 gauge, base	4 40
Chequered floor plate, 3-16 in.	6 50
Chequered floor plate, ¼ in.	6 25
Staybolt iron	8 00
Bessemer rails, heavy, at mill	....
Steel bars, Pittsburgh	2 35
Tank plates, Pittsburgh	2 65
Structural shapes, Pittsburgh	2 45
Steel hoops, Pittsburgh	3 05
F.O.B., Toronto Warehouse	
Small sapes	4 25
F.O.B. Chicago Warehouse	
Steel bars	3 62
Structural shapes	3 72
Plates	3 90
Small shapes under 3"	3 62

FREIGHT RATES

Pittsburgh to Following Points	Per 100 Pounds C.L.	L.C.L.
Montreal	33	45
St. John, N.B.	41½	55
Halifax	49	64½
Toronto	27	39
Guelph	27	39
London	27	39
Windsor	27	39
Winnipeg	89½	135

METALS

	Gross.	
Lake copper	$25 00	$26 25
Electro copper	24 50	26 00
Castings, copper	24 50	25 00
Tin	58 00	58 00
Spelter	10 00	10 00
Lead	7 75	7 00
Antimony	10 00	10 50
Aluminum	33 00	35 00

Prices per 100 lbs.

PLATES

	Montreal	Toronto
Plates, ¼ up	$ 4 50	$ 4 75
Plates, 3-16 in.	4 90	5 25

Price List No. 38

WROUGHT PIPES

Standard Buttweld

⅛ in.	$ 6 00	$ 8 00
¼ in.	4 68	6 81
⅜ in.	4 68	6 81
½ in.	6 21	7 78
¾ in.	7 82	9 95
1 in.	11 56	14 71
1¼ in.	15 64	19 90
1½ in.	18 70	23 76
2 in.	25 16	32 01
2½ in.	40 37	51 19
3 in.	52 79	66 94
3½ in.	67 16	84 18
4 in.	79 57	99 74

Standard Lapweld

2 in.	38 81	35 34
2½ in.	42 12	52 36
3 in.	55 08	68 47
3½ in.	69 00	86 94
4 in.	81 75	103 00
4½ in.	93	1 18
5 in.	1 08	1 37
6 in.	1 40	1 78
7 in.	1 83	2 32
8L in.	1 93	2 44
8 in.	2 22	2 81
9 in.	2 66	3 36
10L in.	2 46	3 12
10 in.	3 17	4 02

Terms 2% 30 days, approved credit.

Freight equalized on Chatham, Guelph, Hamilton, London, Montreal, Toronto, Welland.

Prices—Ontario, Quebec and Maritime Provinces

WROUGHT NIPPLES

4" and under, 60%.
4½" and larger 50%.
4" and under, running thread, 30%.
Standard couplings, 4" and under, 40%, 4½" and larger, 20%.

OLD MATERIAL

Dealers' Average Buying Prices.

	Per 100 Pounds. Montreal	Toronto
Copper, light	$15 00	$13 75
Copper, crucible	18 00	18 00
Copper, heavy	18 00	18 00
Copper wire	18 00	18 00
No. 1 machine composition	16 50	16 75
New brass cuttings	13 00	10 75
Red brass cuttings	14 50	14 75
Yellow brass turnings	9 00	9 00
Light brass	7 50	7 00
Medium brass	9 00	7 75
Scrap zinc	6 00	6 00
Heavy lead	5 00	5 25
Tea lead	3 75	3 50
Aluminum	18 00	18 00
	Per Ton.	Net
Heavy melting steel	13 50	13 50
Boiler plate	13 50	11 00
Axles (wrought iron)	20 00	20 00
Rails (scrap)	14 50	13 50
Malleable scrap	15 00	17 00
No. 1 machine cast iron	21 00	18 00
Pipe, wrought	10 00	5 00
Car wheels	20 00	20 00
Steel axles	20 00	20 00
Mach. shop turnings	6 00	6 00
Stove plate	15 00	13 00
Cast boring	7 00	8 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Carriage bolts, ⅜" and less	35
Carriage bolts, 7-16 and up	15
Coach and lag screws	50
Stove bolts	65
Wrought washers	50
Elevator bolts	25
Machine bolts, 7-16 and over	40
Machine bolts, ⅜" and less	40
Blank bolts	25
Bolt ends	25
Machine screws, fl. and rd. hd., steel	27½
Machine screws, o. and fil. hd., steel	10
Machine screws, fl. and rd. hd., brass	net
Machine screws, o. and fil. hd., brass	net
Nuts, square blank	add $0 75
Nuts, square, tapped	add 1 00
Nuts, hex., blank	add 1 00
Nuts, hex., tapped	add 1 25
Copper rivets and burrs, list less	15
Burrs only, list plus	25
Iron rivets and burrs	40 and 5
Boiler rivets, base ¾" and larger	$8 50
Structural rivets, as above	8 40
Wood screws, O. & R., bright	75
Wood screws, flat, bright	77½
Wood screws, flat, brass	55
Wood screws, O. & R., brass	55½
Wood screws, flat, bronze	50
Wood screws, O. & R., bronze	47½

MILLED PRODUCTS

(Prices on unbroken packages)

	Per Cent.
Set screws	50
Sq. and Hex. Head Cap Screws	45
Rd. and Fil. Head Cap Screws	20
Flat But. Hd. Cap Screws	10
Fin. and Semi-fin. nuts up to 1 in.	45
Fin. and Semi-fin. nuts, over 1 in., up to 1½ in.	40
Fin. and Semi-fin. nuts over 1½ in., up to 2 in.	25
Studs	30
Taper pins	50
Coupling bolts	10
Planer head bolts, without fillet, list	10
Planer head bolts, with fillet, list plus 10 and	net
Planer head bolt nuts, same as finished nuts.	
Planer bolt washers	net
Hollow set screws	net
Collar screws	list plus 20, 30
Thumb screws	40
Thumb nuts	75
Patch bolts	add 20
Cold pressed nuts to 1½ in.	add $1 00
Cold pressed nuts over 1½ in.	add 2 00

BILLETS

	Per gross ton
Bessemer billets	$38 50
Open-hearth billets	38 50
O.H. sheet bars	42 00
Forging billets	51 00
Wire rods	52 00

Government prices.

F.O.B. Pittsburgh.

NAILS AND SPIKES

Wire nails	$4 70
Cut nails	4 75
Miscellaneous wire nails	60%
Spikes, ⅝ in. and larger	$7 50
Spikes, ¼ and 5-16 in.	8 00

ROPE AND PACKINGS

Drilling cables, Manila	0 39
Plumbers' oakum, per lb.	0 10
Packing, square braided	0 38
Packing, No. 1 Italian	0 44
Packing, No. 2 Italian	0 36
Pure Manila rope	0 37
British Manila rope	0 31
New Zealand hemp	0 31
Transmission rope, Manila	0 43
Cotton rope, ¼-lb. and up	0 74

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	net

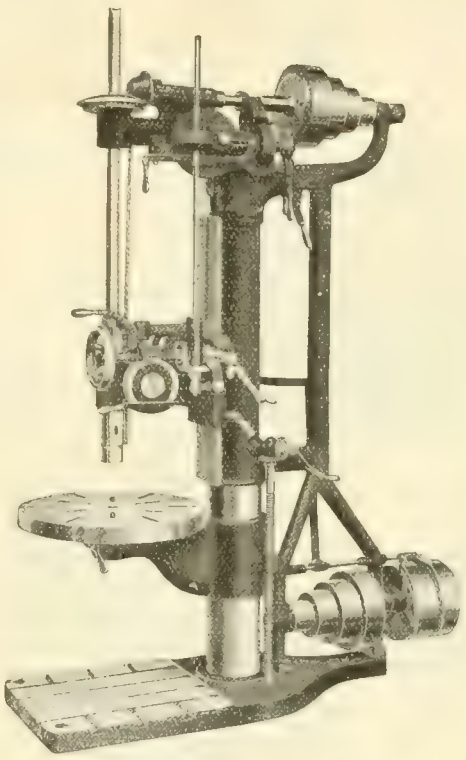
A Complete Line 8 in. to 50 in. Swing
with or without tapping attachment

BARNES

Upright Drills
Horizontal Drills
Gang Drills

Accuracy—Strength
Convenience of Operation

Carried in Stock by



26 in. Slid. Head Type

THE A. R. WILLIAMS MACHINERY CO., Ltd. 64 FRONT ST. WEST TORONTO

MONTREAL ST. JOHN, N.B. WINNIPEG VANCOUVER HALIFAX BUFFALO, N.Y.

Acid Electric STEEL CASTINGS

Acid Electric Steel Castings show superior ability to resist wear and crystallization. They are smooth in texture, free from Blow Holes, and machine perfectly. We specialize in

Railroad and Other High Grade Castings

up to 15 tons, any specification. Electric Steel Castings COST NO MORE than ordinary Steel Castings.

Prices on Application—Prompt Deliveries

The Thos. Davidson Mfg. Co., Limited

Steel Foundry Division, Lachine Canal
Head Office: 187 Delisle St. MONTREAL
Phone Victoria 1492

MORROW SCREWS MORROW
DRILLS FILES
MORROW NUTS MORROW

MORROW
INGERSOLL

Best jobbers carry "Morrow's."

"Morrow" Screws (it's the finishing die that does it).

"Morrow" Nuts.

"Morrow" Twist Drills "will do more drilling with less regrinding."

All of the highest possible quality made in Canada by contented, intelligent experts in the largest and best equipped plant of its kind in the Dominion.

John Morrow Screw & Nut Co.
LIMITED
INGERSOLL CANADA

Always, everywhere, use "Morrow" products. Made just a little better than seems necessary.

MISCELLANEOUS

Solder, strictly	$ 0 34
Solder, guaranteed	0 39
Babbitt metals	18 to 70
Soldering coppers, lb.	0 58
Lead wool, per lb.	0 14
Putty, 100-lb. drums	6 75
White lead, pure, cwt.	17 80
Red dry lead, 100-lb. kegs, per cwt.	15 50
Glue, English	0 35
Tarred slater's paper, roll	1 30
Gasoline, per gal., bulk	0 33
Benzine, per gal., bulk	0 32
Pure turpentine, single bbls., gal.	1 50
Linseed oil, raw, single bbls.	2 90
Linseed oil, boiled, single bbls.	2 92
Plaster Paris, per bbl.	4 50
Sandpaper, B. & A.	List plus 43
Emery cloth	List plus 37½
Sal Soda	0 03½
Sulphur, rolls	0 05
Sulphur, commercial	0 04½
Rosin "D," per lb.	0 07
Rosin "G," per lb.	0 08
Borax crystal and granular	0 14
Wood alcohol, per gallon	2 00
Whiting, plain, per 100 lbs.	2 50

CARBON DRILLS AND REAMERS

S.S. drills, wire sizes up to 52	40
S.S. drills, wire sizes, No. 53 to 80	50
Standard drills, all sizes	50
3-fluted drills, plus	10
Jobbers' and letter sizes	50
Bit stock	40
Ratchet drills	15
S.S. drills for wood	40
Wood boring brace drills	25
Electricians' bits	30
Sockets	50
Sleeves	50
Taper pin reamers	net
Drills and countersinks	list plus 10
Bridge reamers	50
Centre reamers	10
Chucking reamers	net
Hand reamers	10
High speed drills, list plus	10 to 40
Canadian high speed cutters	net
American	plus 40

COLD ROLLED SHAFTING

At mill ..... list plus 5%
At warehouse ..... list plus 25%
Discounts off new list. Warehouse price at Montreal and Toronto

IRON PIPE FITTINGS

Malleable fittings, class A, 20% on list; class B and C, net list. Cast iron fittings, 15% off list. Malleable bushings, 25 and 7½%; cast bushings, 25%; unions, 45%; plugs, 20% off list. Net prices malleable fittings; class B black, 24½c lb.; class C black, 15¾c lb.; galvanized, class B, 34c lb.; class C, 24½c lb. F.O.B. Toronto.

SHEETS

	Montreal	Toronto
Sheets, black, No. 28	$ 6 55	$ 6 75
Sheets, black, No. 10	5 15	5 65
Canada plates, dull, 52 sheets	8 50	7 10
Can. plates, all bright.	8 50	8 00
Apollo brand, 10¾ oz. galvanized	....	....
Queen's Head, 28 B.W.G.	....	....
Fleur-de-Lis, 28 B.W.G.	....	....
Gorbal's Best, No. 28	....	....
Colborne Crown, No. 28.	....	....
Premier, No. 28 U.S.	....	8 20
Premier, 10¾ oz.	....	8 50
Zinc sheets	20 00	20 00

PROOF COIL CHAIN

(Warehouse Price)

B

¼ in., $13.00; 5-16, $11.00; ⅜ in., $10.00; 7-16 in., $9.80; ½ in., $9.75; ⅝ in., $9.20; ¾ in., $9.30; ⅞ in., $9.50; 1 in., $9.10; Extra for B.B. Chain, $1.20; Extra for B.B.B. Chain, $1.80.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in., $16.75; 3-16 in., $15.40; ¼ in., $13.00; 5-16 in., $11.00; ⅜ in., $10.00; 7-16 in., $9.80; ½ in., $9.75; ⅝ in., $9.50; ¾ in., $9.30.

Prices per 100 lbs.

FILES AND RASPS

	Per Cent.
Globe	50
Vulcan	50
P.H. and Imperial	50
Nicholson	32½
Black Diamond	27½
J. Barton Smith, Eagle	50
McClelland, Globe	50
Delta Files	20
Disston	40
Whitman & Barnes	50
Great Western-American	50
Kearney & Foot, Arcade	50

BOILER TUBES.

Size.	Seamless	Lapwelded
1 in.	$27 00	$.....
1¼ in.	29 00	.....
1½ in.	29 50	26 00
1¾ in.	32 00	26 00
2 in.	31 00	26 00
2¼ in.	35 00	28 00
2½ in.	43 00	32 00
3 in.	48 00	40 00
3½ in.	.....	41 00
3½ in.	60 00	42 00
4 in.	75 00	56 00

Prices per 100 ft., Montreal and Toronto

OILS AND COMPOUNDS.

Castor oil, per lb.	.....
Royalite, per gal., bulk	22½
Palacine	25½
Machine oil, per gal.	36
Black oil, per gal.	16
Cylinder oil, Capital	62
Cylinder oil, Acme	45
Standard cutting compound, per lb.	0 06
Lard oil, per gal.	$2 60
Union thread cutting oil, antiseptic	88
Acme cutting oil, antiseptic	37½
Imperial quenching oil	39½
Petroleum fuel oil, bbls. net	8

BELTING—No 1 OAK TANNED

Extra heavy, single and double	30%
Standard	30, 10%
Cut leather lacing, No. 1	2 20
Leather in sides	1 75

TAPES

Chesterman Metallic, 50 ft.	$2 00
Lufkin Metallic, 603, 50 ft.	2 00
Admiral Steel Tape, 50 ft.	2 75
Admiral Steel Tape, 100 ft.	4 45
Major Jun. Steel Tape, 50 ft.	3 50
Rival Steel Tape, 50 ft.	2 75
Rival Steel Tape, 100 ft.	4 45
Reliable Jun. Steel Tape, 50 ft.	3 50

PLATING SUPPLIES

Polishing wheels, felt	4 00
Polishing wheels, bull-neck	2 25
Emery in kegs, American	06
Pumice, ground	06
Emery glue	35
Tripoli composition	09
Crocus composition	12
Emery composition	10
Rouge, silver	50
Rouge, powder, nickel	45

Prices per lb.

ARTIFICIAL CORUNDUM

Grits, 6 to 70 inclusive	.08½
Grits, 80 and finer	.6

BRASS—Warehouse Price

Brass rods, base ½ in. to 1 in. rod	0 34
Brass sheets, 24 gauge and heavier, base	$0 42
Brass tubing, seamless	0 46
Copper tubing, seamless	0 48

WASTE

XXX Extra	19½	Atlas	17
Peerless	19	X Empire	15½
Grand	18	Ideal	16
Superior	18	X Press	14
X L C R	17		

Colored

Lion	15	Popular	12
Standard	13½	Keen	10½
No. 1	13½		

Wool Packing

Arrow	25	Anvil	15
Axle	20	Anchor	11

Washed Wipers

Select White	11	Dark colored	09
Mixed colored	10		

This list subject to trade discount for quantity.

RUBBER BELTING

Standard ... 10% Best grades ... 15%

ANODES

Nickel	.58 to .65
Copper	.38 to .45
Tin	.70 to .70
Zinc	.18 to .18

Prices per lb.

COPPER PRODUCTS

	Montreal	Toronto
Bars, ½ to 2 in.	$42 50	$43 00
Copper wire, list plus 10		
Plain sheets, 14 oz., 14x60 in.	46 00	44 00
Copper sheet, tinned, 14x60, 14 oz.	48 00	48 00
Copper sheet, planished, 16 oz. base	46 00	45 00
Braziers', in sheets, 6 x 4 base	45 00	44 00

LEAD SHEETS

	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	$11 75	$11 50
Sheets, 3½ lbs. sq. ft.	10 50	11 00
Sheets, 4 to 6 lbs. sq. ft.	10 25	10 50

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS

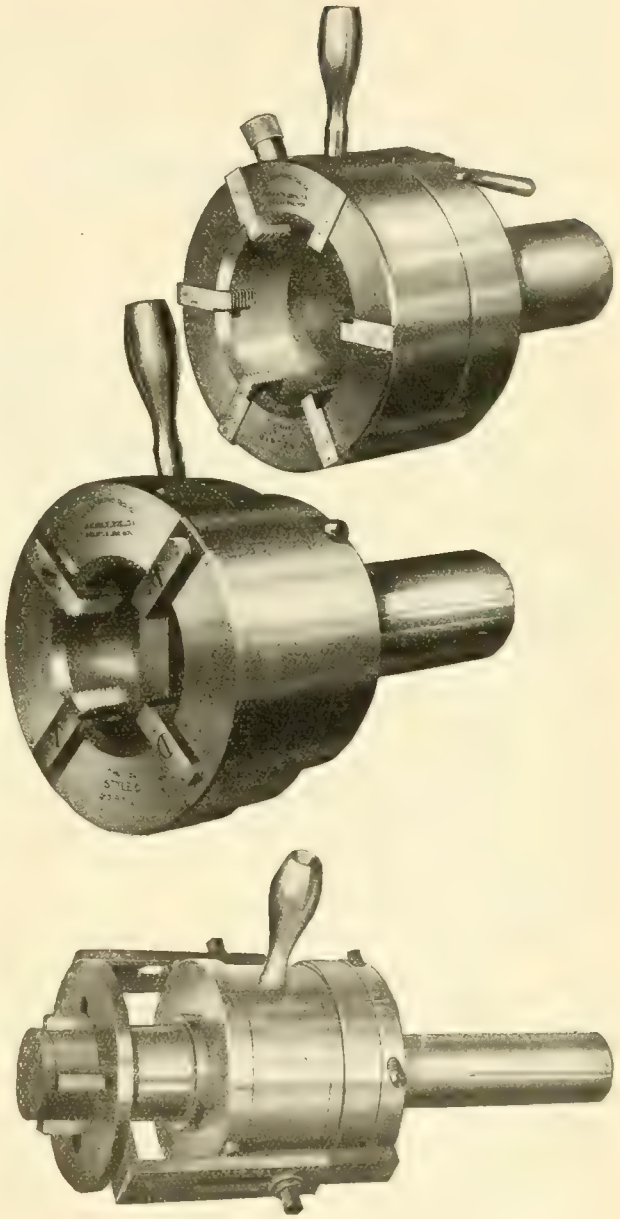
Acid, boracic	$ .25
Acid, yhdrochloric	.04
Acid, nitric	.10
Acid, sulphuric	.04
Ammonia, aqua	.13
Ammonium, carbonate	.20
Ammonium, chloride	.22
Ammonium hydrosulpuret	.50
Ammonium sulphate	.30
Arsenic, white	.14
Copper, carbonate, annhy.	.41
Copper, sulphate	.16
Cobalt, sulphate	.20
Iron perchloride	.62
Lead acetate	.30
Nickel ammonium sulpate	.16
Nickel carbonate	32
Nickel sulpate	.18½
Potassium carbonate	.50
Potassium sulphide (substitute)	.42
Silver chloride (per oz.)	1.25
Silver nitrate (per oz.)	1.20
Sodium bisulphate	.18
Sodium carbonate crystals	.06
Sodium cyanide, 127-130%	.38
Sodium hyposulphite per 100 lbs	8.00
Sodium phosphate	.18
Tin chloride	1.75
Zinc chloride, C.P.	.30
Xinc sulphate	.08

Prices per lb. unless otherwise stated

A GOOD BOON

"Geometric Tools are a good boon in our business. Always reliable and sure of turning out a class job; in fact, I don't know how we could secure a decent output without them."

This is what the Works Inspector of a London (England) shop says. He adds that they are making screw and small parts for air craft, and have quite a lot of Geometric Dies in constant use.



Because of the fact that Geometric threading tools are "a good boon" in the thread cutting business, the majority of screw machines and turret lathes are equipped with Geometrics.

THE GEOMETRIC TOOL CO.
NEW HAVEN, CONN.

Canadian Agents:

Williams & Wilson, Ltd., Montreal
The A. R. Williams Machinery Co., Ltd., Toronto, Winnipeg and St. John, N.B.
Canadian Fairbanks-Morse Co., Ltd., Manitoba, Saskatchewan, Alberta

For any thread, any size, any pitch — there's a Geometric Collapsing Tap or Self-Opening Die Head. Be assured there is one to meet your particular threading need — whatever it may be. Ask us.

If interested tear out this page and place with letters to be answered.

The Week's Events in Montreal Industry

Roderic J. McLean, consulting mechanical engineer of Montreal, has just returned from a successful two months' business trip to the British Isles.

The St. Lawrence Iron Foundry of Montreal are gradually disposing of their munitions equipment and they anticipate returning to active foundry operations early in the coming year.

The engineering firm of Peacock Bros. will shortly remove their offices from 285 Beaver Hall Hill to 175 Delorimer Ave., where the manufacturing plant is located and operating under the name of the Clyde Engineering Co. Considerable expansion has taken place recently and still further development is anticipated.

It has been announced that H. H. Vaughn has retired from the executive of the Dominion Bridge Company, to take a more active interest in the operation of the Armstrong, Whitworth of Canada, Limited, of which company he was appointed a director some few months ago. Mr. Vaughn is also actively associated with the recently organized General Combustion Company.

The Oil Engine Works of Canada, 29 Prince St., Montreal, will shortly move their plant to Iberville, Que., where they will occupy a portion of the plant of the Rapid Tool and Machine Company. When in Montreal the bulk of the machine work on the engines was performed in outside shops, and the assembling of the units was not all that could be desired. In their new location nearly all of the work will be carried on at the assembly plant. There is a steadily increasing demand for these engines.

That normal Trans-Atlantic shipping is not yet an accomplished fact is shown by the recent announcement of the British Ministry of Shipping regarding the early 1920 sailings to the West Indies, that had been arranged by the White Star-Dominion Line. The S. S. Megantic was to have been placed on this route for a number of pleasure cruisers, but the powers-that-be have seen fit to decide otherwise, and this vessel will remain on her regular route throughout the winter, to assist in relieving the heavy service that is expected during the next six months.

A. W. Swan, who has been associated with the Canadian Ingersoll-Rand Company, of Sherbrooke, for the last two years, has resigned to take over the position of assistant-secretary for the Engineering Institute of Canada, in the head office at Montreal. Mr. Swan graduated from the University of Toronto, with a B.A.Sc. in 1917 and entered the production department of the Can. Ingersoll-Rand Co. Since March, 1918, he has been assistant in the publicity department, in charge of technical journal advertising.

Owing to the large number of returned men that are taking advantage of the rehabilitation classes throughout the district, it has been found necessary to increase the educational facilities. The large factory recently constructed by Caron Brothers, for the manufacture of American shells, has been acquired by the Government and the draughting classes from the Montreal Technical School, and a large portion of the mechanical class, to the number of about 400, are receiving instruction at this plant. Much of the former equipment is being utilized for the purpose.

The finding of the Board of Conciliation, after investigating the claims of the wireless operators on the Great Lakes, has been announced, and as a result, substantial wage increases will be granted to all wireless operators on the lakes service. The Marconi Company, however, have decided to apply the revised rates to every operator throughout their entire service, in which about six hundred men are engaged. The new rates of pay will mean increases ranging from 50 to 100 per cent. The Board commended the splendid spirit of the Marconi officials, in not alone appreciating the reasonable demands of the men, but also in their immediate willingness to extend the new wage scale to the greater number of operators on the ocean service, not within the present finding of the Board. A recommendation is under consideration for a revision of the present contract with the Government, as regards the operation of wireless stations on the Great Lakes. The contract figure of $3,500 per year per station is less than half that required to maintain efficient service.

The City of Outremont will adopt a new type of snow plough for cleaning the streets during the winter. The device is simply a gas-driven rotary snow fan, similar to those used on the railroads, mounted on sleigh runners and drawn by two or more horses. W. H. Stadig is the inventor and the machines are being built by the Canadian Fairbanks-Morse Co.

Chas. Trawford, of Trawford and Company, chain manufacturers, of Walsall, England, has been in Canada during the past month, visiting their Canadian agents, Thos. Moore and Sons, of 224 Lemoine St., Montreal, with the object of studying the field here for the purpose of developing trade in this country.

The Marconi Wireless Company of Canada have removed their main offices from 173 William Street (the plant location), to 11 St. Sacrament St., Montreal, in the heart of the business district.

G. D. Robinson, who was for twenty-five years with the Canadian Pacific Ocean Service, and European freight agent when he severed his connection recently, has now opened offices in the Coristine building, Montreal, room 511, where he will carry on a business of steamship freight broker, shipping, forwarding and chartering agent.

During a spell of stormy weather last week along the coasts of Nova Scotia considerable damage was done to shipping, and telegraph communications. Quite a number of fishing boats were wrecked or driven ashore, the signal station at Liverpool was blown down, and the three-masted schooner Audrey was wrecked on the rocks at this point.

Demonstrations are now being carried on, at 235 St. James St., Montreal, of a new type of crude oil burner, known as the "Rex." The primary purpose of this device is for the use in the ordinary coal stove or furnace for domestic heating, although the intention of the inventor is to adapt these burners to general industrial as well as domestic use. They operate satisfactory either with natural or forced draft.

The St. Lawrence Sugar Refining Company have just recently equipped three of their six boilers with oil firing apparatus. These three boilers will be operated in direct competition with an identical battery (coal fired). Close check will be kept throughout a period of several months to determine the economic value of oil as a permanent fuel. Tanks have been erected for an oil storage capacity of about 55,000 barrels.

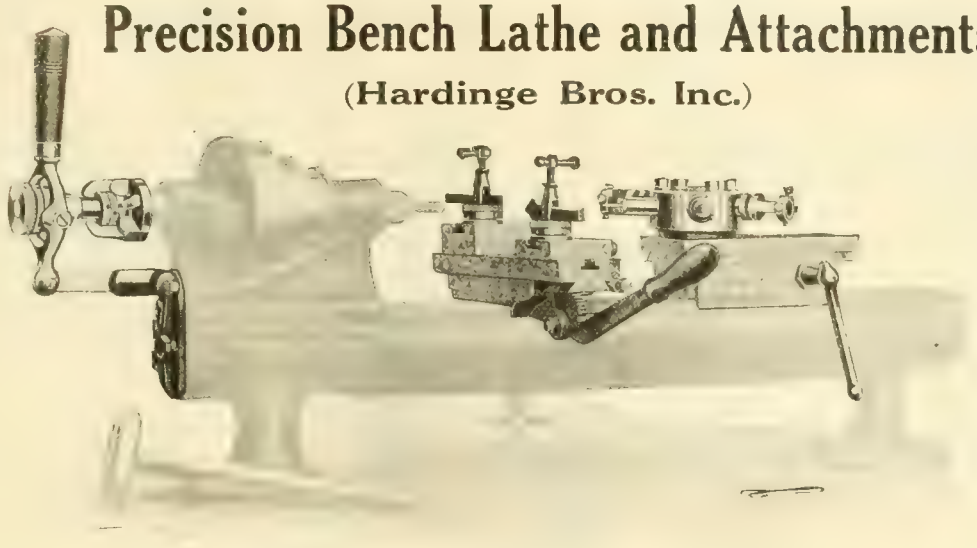
R. M. Rook, who for the past five years has been associated with the Metal Thermit Corporation of New York, has been appointed general foreman of the St. Lawrence Welding Company. Mr. Rook has had a wide experience in welding work of every description, and was directly responsible for the successful repairs on what is considered the largest job yet accomplished by the thermit process. This was on the frame of a large stone machine, the weight of which was approximately 75 tons, requiring about 4 tons of thermit. Nearly seven weeks were required in preparing the mould.

T. W. Rogers has joined the staff of the St. Lawrence Welding Company of

The Cataract

Precision Bench Lathe and Attachments

(Hardinge Bros. Inc.)



Write for particulars of

The Cataract Quick Change Swing Precision Lathe for Tool Makers.

The Cataract Turret-Tool Post Lathe.

The Cataract Power Feed Bench Lathe.

The Cataract Precision Bench Lathes, of which there are six sizes, with full line of attachments.

The Cataract Automatic Gear Cutting Machine.

Draw-Back Chucks and Screw Machine Collets for all sizes.

Special Machines.

Canadian Representatives

Garlock-Walker Machinery Company, Limited

32 Front St. West

Montreal **TORONTO** **Winnipeg**

Montreal, and will have the position of general sales manager of the company. Prior to his recent appointment Mr. Rogers was eight years with Darling Bros., four years as a travelling salesman and the last four as purchasing agent. He was formerly with the heating division of Taylor Forbes Co. The tank development of the St. Lawrence Welding Company will necessitate additional selling organization and Mr. Rogers will have full charge of this department.

At a recent meeting of the Montreal Board of Trade considerable opposition was advanced regarding the proposed advance in wharfage rates that the Harbor Commissioners intend putting into effect at the beginning of the year. It was decided that the council of the Board of Trade interview the Commission to see what can be done as to the withdrawal of the proposed advance, and if this cannot be done to suggest that the matter of the increase be deferred for a time so that the board may have time to bring the whole matter to the attention of the Government.

The St. Lawrence Welding Company of Montreal, have acquired a property adjoining their present plant, which they are now preparing for the installation of the equipment necessary for their tank manufacturing enterprise. Plans now under way will provide this company with adequate facilities for making any size of tank for industrial or domestic purposes. Several machine units have already been ordered and negotiations for others are in progress. The new tank shop will take care of all classes of work up to ½ inch thickness of plate. The company is continually adding to their general equipment; the machine shop has been enlarged, and by the first of the year they will be in a position to take on almost any class of repair work—welding or machine, or both. Their portable electric welding outfit is so mounted that it can be taken to any section of the country where local apparatus is not available for this purpose. The company are now accepting tank orders for delivery after the first of December.

The Oil Engine Works of Canada, operating for the past few months at 29 Prince Street, Montreal, will shortly move their plant to Iberville, Quebec, taking over a portion of the plant now occupied by the Rapid Tool and Machine Company. They are building the Hvid line of oil engine in 6 and 8 h.p., principally for the farm trade. M. L. G. Vincent is the managing director.

The Dominion Bridge Company will utilize the plant of the St. Lawrence Bridge Company at Rockfield, for the building of the pulp and paper machines, a post-war development that promises to grow into extensive proportions. They also anticipate the building of a grey iron foundry for the making of the large number of castings that will be required in these machines and the turbo-equipment that they are now building.

Realizing that the price of building materials will show little, if any, decline for some indefinite period, the Improvement League of the City of Montreal has decided to take immediate steps to relieve the housing problem in the city. At a meeting held in the Windsor Hotel last week the League passed a resolution to the effect that a committee be formed from the executive, and others chosen by it, to prepare a definite scheme of housing, to draw up a definite plan of amendments to the present housing law and to lay before the municipal authorities a practical system of managing the loans either to individuals or corporations. An additional function of this committee will be to press for the completion of the housing commission, which is not yet at full strength. The City Administration hope to complete the personnel of this body before the close of the year, and an active campaign of building operations is expected in the spring.

W. A. McCallum, who has been assistant to the vice-president of the Canadian Tube and Iron Company, and assistant to the president of the Canadian Rolling Mills, and the Colonial Wire Manufacturing Company, has resigned from these positions to accept the office of vice-president to F. E.

Smith, Limited, of Montreal and Toronto, a firm doing a large domestic and export trade in iron and steel refractories.

Last Saturday afternoon, Canadian Vickers, Limited, launched from their yard at Montreal, the seventh vessel that they have completed for the new merchant marine of the Canadian Government. The ceremony was performed by Mrs. Alex. Johnston, the wife of the Deputy Minister of Marine and Fisheries. The latest addition to the Canadian Merchant Marine will have the name of the "Canadian Spinner," and the vessel will be, in all respects, similar to all the others that have been launched from this yard, her dimensions being: 400 feet in length, 52 feet wide, and a moulded depth of 31 feet, and with a deadweight cargo carrying capacity of 8,350 tons. Following the launching a reception was held in the general offices of the company, many notables being present.

WILL MAKE RANGE BOILERS AND TANKS

John Wood Mfg. Co. Make Product That Will Withstand Heavy Pressure

The Canadian John Wood Manufacturing Company of Consnohocken, Pa., are busy at their new Canadian premises, Coxwell Ave., Toronto, getting into shape to commence manufacturing their product in this country.

The firm make range boilers, the seams and heads of which are fastened by electric arc process. They also make air reservoirs and steam receivers by the same process. Much of the machinery used has been developed by the firm themselves as a result of their manufacturing experience. All kinds of pressure-containing vessels have been made by the firm, and tensile tests made of the finished products have shown failure to take place in the sheet, before the weld was affected.

The efficiency of the weld as determined by a British authority is 92 per cent., and this is the figure which their calculations are based upon. However, as shown above, the practical efficiency is higher than this figure, being over 100 per cent. as compared to the solid metal.

Roentgen rays are now used to test the quality of cast metal and discover any internal defects. They offer an excellent method of determining the influence of aluminum and tungsten on steels. Castings an inch and three-quarters thick may be penetrated by the rays disclosing blow holes and similar flaws.

A contemporary says: "Did you ever see a spectacled waiter?" Now, suppose we take note of that question and see what specimens of spectacled waiters we can locate.

"News," Dallas, Texas.

A personal experience that most of us have had lately.

DOMINION TO OPEN UP NEW COAL MINE

In Order to Get Coke Supply For Operating the New Plate Mill

SYDNEY.—"I foreshadowed extensive developments in the Steel Corporation's activities on my arrival in Sydney the other day," said President Mark Workman. The time has come now to announce an important undertaking.

Bonar Point, on the north side of Sydney harbor, where the Dominion Coal Company has land areas, has been selected as the starting point for new coal mining operations to be carried into the company's submarine areas. High-grade metallurgical coal for the new plate mill is the objective. There will be, of course, no diminution of the coal output on the south side of the harbor. That, too, will be increased.

"It will be remembered," continued Mr. Workman, "that the sulphur content in the coal supplied to the Steel plant was the subject of lengthy litigation before the formation of the Dominion Steel Corporation, some years ago. This impurity exists to a more or less extent in all Nova Scotia coals. In the case of the areas which our company intends to open up the content of sulphur is less than one per cent. The immediate reason for the sinking of the new mine is the imminence of the operations of the new plate mill. The quality of steel required in the manufacture of that mill's product is of high grade, and only the finest metallurgical coal should be used in its preparation."

In Mr. Workman's opinion it is obviously a policy of wisdom on the part of the Steel Company's executive to ensure quality in the building up of the materials for an industry which will undoubtedly mean much to Cape Breton, as it foreshadows the inauguration of steel shipbuilding on a huge scale. It is quite within the range of possibility that the building of ships in the Province of Nova Scotia will be second in importance only to that of the coal mining industry.

The plans which have been prepared for the new mining activities involve the expenditure of approximately two million dollars, and provide for the most modern equipment procurable.

A large number of houses will be erected for the employees, and it is not difficult to see that the new expansion will place a large sum of money in circulation in this district

Announcement of Special Interest

to users of

Drop Forgings

THE Dominion Forge & Stamping Company have sold their two Stamping Plants.

This means that the entire resources and energies of the Company will be devoted to the Drop Forge Industry.

Extensive additions are being made to their Forge Plant to take care of the increasing demand for drop forgings in Canada.

This Plant is one of the largest and best equipped drop forge plants on the continent; and to maintain this position in the industry the company decided on this policy of concentration.

Forgings are made to customer's blue prints and specifications. Inquiries are solicited.

Dominion Forge & Stamping Co., Ltd.

Walkerville, Ontario

Toronto Office: 206 Excelsior Life Bldg.

If interested tear out this page and place with letters to be answered.

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"HAWK" BRAND STEEL

REGISTERED U.S. PAT. OFFICE NOS. 50932 & 94
CANADIAN PAT. OFFICE NO. 94

HAWK VANADIUM" TOOL STEEL

Remarkable in its glass Hardness, Toughness and Cutting Efficiency.

Will give twice the cut of a regular tool steel at one grinding.

Order "Hawk Vanadium" for your End Mills and cutters. Once known—always used.

Large Stock. Prompt Shipment.

Write for full particulars to

Hawkridge Brothers Company

Main Office and Warehouse:
303 Congress Street, Boston, Mass
Storehouses Malden Mass

STEEL
OF EVERY DESCRIPTION
SEND US YOUR ENQUIRIES

PATENTS FOR SALE

Two Canadian Patented Steam Specialties for sale; one Steam Trap, Patent Number 187215, and one Steam Separator, Patent Number 183340.

Allentown Experimental Works
Allentown, Pa., U.S.A.

A Drinking Water Service that will last a LIFETIME

What you will pay for a few ordinary drinking cups will meet the cost of the

PURO SANITARY DRINKING FOUNTAIN

(MADE IN CANADA)

DRINKING CUPS ARE UNSANITARY but the "Puro" delivers clean, fresh water at a reduction of 15% to 35% in water bill

"PURO" WILL SAFEGUARD THE HEALTH OF YOUR EMPLOYEES and protect your staff against disorganization by sickness.

Easily attached. Simply unscrew the ordinary faucet and put on the "Puro."

Write us to-day for full information regarding the cost of installation of the "PURO" Sanitary Drinking Fountain Service

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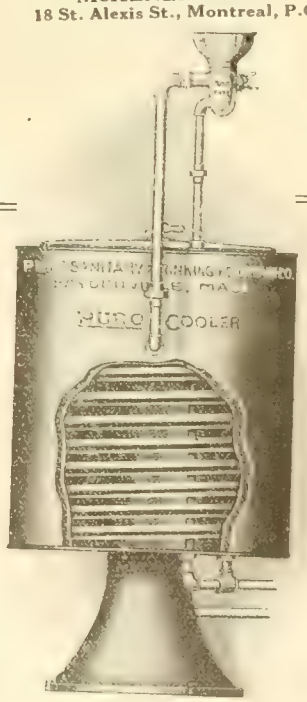

Victoria, B.C.—Admiral Jellicoe arrived at Esquimault on the battle cruiser "New Zealand.' This begins his Canadian tour. He will go to Vancouver, and return from there to Victoria, after which he goes to Ottawa. He will confer with the Dominion authorities on naval questions, and give his advice if requested. The admiral is accompanied by Lady Jellicoe.

C.G.E. Invade Stratford.—The factory of the Mooney Biscuit and Candy Co. has been purchased by the General Electric Company, who are overhauling and fitting it up. They expect to have 200 employees working by the end of the year, and will employ 700 when fully organized.

Leaside Plant Nearly Demolished.—The buildings at Leaside, belonging to the United States Munition Board, are being rapidly torn down. There are about fifty men at work on the job, and the material is being piled on the ground in readiness for shipment to the U.S. The new building, known as the C plant, which it is stated cost $2,000,000 to build, will soon be in the hands of the wreckers.

Canadian Traffic League.—The annual meeting of the Canadian Traffic Managers' League was held in the rooms of the Canadian Manufacturers' Association recently, and the following officers were elected: Hon. Pres., J. E. Welsh; Hon. Vice-Pres., T. Marshall; Pres., A. W. Bell; Vice-Pres., F. W. Dean; ec.-Treasurer, A. H. Thorpe; Executive Committee, S. B. Brown, G. P. Ruickbe, N. Boyd, F. A. Nance and R. Halliday. There were about 60 members present.

Workmen's Compensation.—Figures given out by the Workmen's Compensation Board, for the first ten months of the year, show an increase in amount of compensation awarded, though accidents were fewer in number. The average number of accidents monthly, were 3,897, though October showed 4,329. The amount paid out was $2,859,448. The total for the year is expected to be well over the 1918 figures. The reason given is the general increase in wages.

Fuel Controller Appointed.—Mr. H. A. Harrington will be Ontario's Fuel Controller for the coming winter. Sir George Foster recently wired Sir William Hearst, asking the Provincial Government's co-operation in connection with the coal situation, brought about by the strike in the U.S. The Minister under whose department the fuel controller works, turned the job over to Mr. Harrington, who is peculiarly fitted to handle it.

Chemical Development in Saskatchewan.—What may easily become one of Western Canada's leading industries is about to be opened up on the shores of Whiteshore Lake, near Oban. The Whiteshore Chemical Company has been organized to work the sodium sulphate deposits of the lake. The deposit is shown by analysis to be 97 per cent pure. Pulp mills, by using this ingredient, can increase their by-products from twelve to forty, one of them being artificial silk. There are 92 pulp mills in Canada, so the company has a big field. A by-product of sodium sulphate is stock salt, which is a substitute for Glauber. This will be only one of many other by-products.

SURPLUS EQUIPMENT FOR SALE

PRESSES

	Stroke Inches	Width Bed	Approx. Cap. Tons
2—No. 666 Toledo Embossing Presses	2	32	1,200
1—No. 26 Bliss Embossing Press	2	30	800
2—No. 27 Bliss Embossing Presses	2	32	1,000
3—No. 77½ Bliss Crank Presses, double back geared	18	30	350
2—No. 87 Bliss Crank Presses, double back geared	16	27	250
2—No. 60½ Bliss Rack and Pinion Drawing Presses	60	21	100
12—No. 60½ Bliss Rack and Pinion Drawing Presses	42	21	100
1—No. 857 Toledo Rack and Pinion Drawing Press	48	25	100
1—Robertson Hydraulic Press with pump and extra set of columns	24	27	800

LATHES

35—Special Cartridge Case Bullard Turret Lathes.

FURNACES

5—25′ x 8′ Rockwell Double Door Annealing Furnaces.

2—16′ x 8′ Rockwell Double Door Annealing Furnaces.

Above equipped with combination oil and gas burners, recording and indicating pyrometers, air rams and air pullers, etc.

1—Gas Furnace for annealing brass turnings.

Hardening Furnaces and Tanks.

MISCELLANEOUS

1—Metal Band Saw.

1—Gray Metal Cutter.

1—No. 1 Quick Work Rotary Shear, 60″ throat.

1—Tinius Olsen Testing Machine, 10,000 lbs.

1—Brinell Testing Machine.

1—Boland Sand Blast Machine (new).

1—Sauveur Boylston Photo Micrograph Outfit.

1—No. 2 Garvin Vertical Tapping Machine (new).

Number of Speed Lathes.

Connersville Positive Blowers.

Sheleton Blowers.

Sturtevant Blowers.

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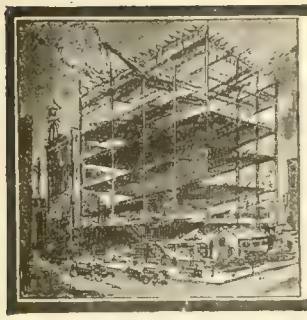
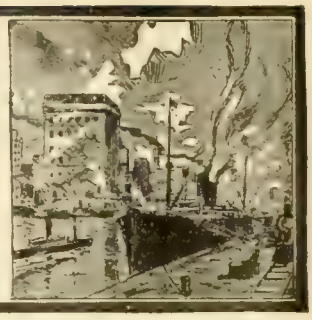


INDUSTRIAL NEWS

NEW SHOPS, TENDERS AND CONTRACTS PERSONAL AND TRADE NOTES



TRADE GOSSIP

U. K. Trade Commissioner Here.—Mr. Harrison Watson, Chief Trade Commissioner to the United Kingdom, is visiting Canada to interview manufacturers who are interested in export trade to that country. He will be in Toronto till Thursday, Nov. 14th.

Protest Against Factory.—The Canadian Collapsible Tube Company, which purposed building a factory on the site of the Parkdale Assembly Rooms, Lansdowne Avenue, has incurred the wrath of the residents on that street. A deputation of them waited on the Board of Control to protest against the erection of the factory.

Ask Government Control of Ferries—A delegation from Windsor has gone to Ottawa to try and secure Government control for the Detroit-Windsor ferries. Parliament will be asked to amend the customs act under which ferry companies operate in Canadian waters. The company can at present charge any fare it likes; as it is operating without license from the Dominion authorities.

Ready to Award Contracts.—The Norton Co. of Worcester, Mass., have started work on the factory they are going to build in Hamilton. The first buildings will be one of three and a half storeys, 50x100 feet, and a second two storeys high, 60x160. The company will manufacture their well-known line of grinding wheels and machines.

St. Thomas May Have No Gas.—Eighteen cars of coal bound for the gas plant at St. Thomas have been seized while in transit, and given over for the use of the B. & L. E. Transit Company. This was under an order of the U. S. Fuel Administrator. This may result in the stoppage of the gas plant. Mr. Caughell, manager of the Gas Company, has taken the matter up with the Ontario Fuel Controller.

Canadian Loco Retains President.—At a meeting of the directors of the Canadian Locomotive Co., held for the purpose of taking action on the resignation of the president, Mr. F. G. Wallace, the Board insisted on Mr. Wallace retaining office. A six months' leave of absence was granted to Mr. Wallace, and it is understood that the active management of the company's affairs will be left to Mr. Wm. Casey, the general manager.

Lyall Shipyard For Sale.—The Lyall Shipyard in North Vancouver is advertised for sale, there being no further work in sight for it. The yard was started for the purpose of building wooden ships, and 40,000 tons of these vessels were constructed. During its building activity, the yard consumed 22,000,000 feet of Douglas fir, and spent $2,500,000 in wages. At its busiest period it employed 1,400 men.

Mr. Workman at Sydney.—Mr. Mark Workman, president of the Dominion Steel Corporation, was in Sydney recently inspecting the progress of the new plate mill. He denied the rumors of negotiations looking toward amalgamation with the Nova Scotia Steel and Coal Co.; stated that the new mill would be operating in a few months, and announced the immediate commencement of mining in a new coal area. This is at Bonar Point, on the north side of Sydney Harbor, and the coal from there will be used in connection with the new plate mill.

Building at Hamilton.—Engineers of the Norton Company, one of the new industries recently landed by Industrial Commissioner C. W. Kirkpatrick, at Hamilton, have been in the city awarding contracts for the erection of the Norton Co. buildings. These will be located at the foot of Lottridge Street and will include one 50 by 100 feet, three and a half stories high, and one 60 by 160 feet, two stories high. The new company will manufacture grinding wheels and grinding machinery. The contracts will probably be let on the cost plus system.

Railway Board Reserves Decision.—On the application of the Canadian Manufacturers' Association, demanding that the express companies be compelled to carry electric light bulbs at first-class rates instead of double rates as at present, the Board reserved its decision. The express companies claimed that owing to the bulbs being very light, and occupying excessive space, they were not profitable to carry. The chairman said that he could not accept the idea that express companies should carry only what they wished. They were a public utility, and as such must perform the services the public demanded of them.

TENDERS

The town of Saskatchewan is about to propose by-laws for the following equipment: new pumps, about $7,000; 4,500 k.w. turbine, about $60,000.

The Chemical Products Corporation, Ltd., Toronto, are considering the erection of a plant in Belleville at an estimated cost of $1,000,000.

For the erection of a new school on Greenwood Ave., Riverdale, Toronto, the advisory committee of the Board of Education have recommended a sum of $200,000 to be placed in the estimates for 1920.

The Lignite Utilization Board of Canada is calling for tenders for briquetting machinery. Specifications and information can be obtained from the Secretary of the Board, at their offices, 80 St. Francois Xavier street, Montreal, and tenders must be in by December 14th, 1919.

MARINE

Fort William.—The Nichols Chemical Company are about to erect a 600-foot dock and loading hoists on the mission. The dock will be located near the Grand Trunk Pacific property.

Cleveland.—Owing to a combination of heavy weather, together with a low temperature that made the handling of ore difficult, there are about twenty-five steamers waiting for cargoes at Duluth. Several steamers which were from twelve to twenty-four hours overdue have arrived safely.

Collingwood.—The Collingwood Shipbuilding Company have carried out successful trials on the "Canadian Gunner," the fourth vessel built by them recently, and she will be handed over to her owners immediately. She was built for C.G.M.M., and will sail from Montreal about the 15th November.

Port. Arthur.—In the recent heavy wind and snow storm on Lake Superior, fifteen vessels, including the Assiniboia and the Huronic, were compelled to seek shelter behind islands. The steamers Glen Ellen and Glen Lyon, which were considerably overdue and the cause of much anxiety, have arrived safely at Fort William.

Washington.—Due to the strike of bituminous coal miners, orders have been issued to discontinue coaling of

foreign vessels in American ports. The U.S. Government have been advised that it is just possible to take care of American requirements, so all other vessels will have to obtain their bunkers elsewhere, presumably Canada.

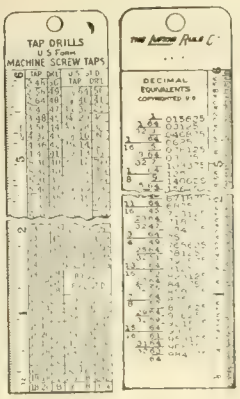
Cleveland.—The end of the lake season is nearly at hand. More than sixty hulk freighters have been sent to their winter quarters. There is a scarcity of cargoes. The cold weather in the Northwest has held up the ore movement. Steamers are taking cargoes to hold, as there is little storage room on the docks, and furnaces are unable to take it.

Government Fleet Profitable.—During the course of an interview with a deputation from Collingwood, the Hon. Mr. C. C. Ballantyne, Minister of Marine, made some interesting statements. He informed the visitors that during the time the vessels so far delivered to the Government had been operating they had made sufficient profit to pay their own cost price. Furthermore, the Government, if it so wished, could dispose of any of their vessels at a profit. All the vessels so far built on the Great Lakes were booked up until June next. The fact of the Government having their own ships available had been a very helpful factor to the export business of the country during the difficult times following the armistice.

PERSONAL

Mr. James Arnold, at present works manager of the James Smart plant at Brockville, has been appointed assistant general manager of the Canada Foundries & Forgings, Ltd. The Smart plant is a subsidiary of the Canada Foundries. Mr. Arnold has been works manager since January last..

The death occurred at his late residence in Toronto on Thursday, October 30th, of Charles Seymour Archibald, sales representative of the Nicholson File Co., Port Hope, Ont., in his sixty-fifth year. Born at Halifax, N.S., of Loyalist descent. He went West in the early days before the building of the C.P.R., later returning to Nova Scotia, where he conducted a wholesale and retail hardware business at Antigonish, under the name of Archibald & Whiddon and later Archibald & Sweet. Later he became connected with the Portland Rolling Mills and Maritime Nail Works of St. John, N.B., and in 1906 moved to Toronto and from that time to the time of his death was sales representative of the Nicholson File Co., Port Hope. He was well and favorably known by all the hardware and iron and steel trade of Canada and will be mourned by a wide circle of friends. He was married in 1883 to Margaret A., daughter of L. J. Crowe of Truro, N.S., and is survived by his widow and six children. Miss Jean at home. Mrs. C. V. Earl, of Toronto; Mrs. G. N. Dalton, of Montreal; C. P. Archibald, of Charles P. Archibald & Co., machinery dealers, Montreal; Lloyd M., of the Dart Union Co., Toronto, and Dr. C. H., of Toronto.



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Planers, Engine and Axle Lathes, Slotters, Boring and Turning Mills, Horizontal Boring and Drilling Machines.
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408 BLOSSOM ROAD, ROCHESTER, N.Y.

MORTON MANUFACTURING CO
PORTABLE PLANERS
DRAW CUT SHAPERS
SPECIAL DRAW CUT R.R. SHAPERS
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High Class *Machine Tools* for SHIPYARDS AND CONSTRUCTIONAL WORKS.
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OVENS
Japanning and Varnishing Ovens heated by Gas, Electricity, Steam or Coal. Kernchen Siphonage Ventilators, Bakers' Ovens, trucks, casters, etc. Write for Booklet.
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SAYS THE MASTER MECHANIC The Greb Automatic Grip Puller is a One-Man Puller—Quick-acting, strong and simple in the extreme. May be locked in any desired position. A combination of two or three arms. Heavy Duty Size capacity 1" to 18"—Junior size capacity 1" to 7". Two sets of jaws furnished with each size.
TEN DAYS' TRIAL.—If your dealer or jobber does not have them we will send you one. Try it ten days. If not satisfactory, return to us and we will refund your money. We also make the GREB RIM TOOL.
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Also a complete line of Mechanical Cold Drawn Seamless Steel Tubing
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BY WELL-KNOWN BRITISH MANUFACturer, young unmarried man to act as sales representative. Must be keen, aggressive, steady business getter, resourcesful and absolutely reliable. To such a man a good future will open up. The line is high grade textile belting, paper makers' felts and linen fire hose, and a stock will be carried. Box 638, Canadian Machinery. (c24m)

MACHINE TOOL SALESMAN WANTED. Must have experience in both iron and woodworking machinery. Applications by mail only stating experience, etc. Canada Machinery Corporation, Limited, Galt, Ont. (c20m)

MACHINERY WANTED

COLLIEAU CUPOLA, 10 TO 12-TON WITH direct connected Sturtevant Blower, 1800 R.P.M., 220 volts, 3 phase. Must be in good condition. Send full particulars to Box No. 637, Canadian Machinery. (c20m)

WANTED SECOND-HAND ALLIGATOR Shears for cutting steel bars in good condition. Send particulars to Dillon Crucibue Alloys, Limited, Welland. (c21m)

FOR SALE

ABOUT 150 LBS. RED CUT SUPERIOR ANnealed High Speed Steel 4 x ½" at 20% less than cost for cash. Write A. E. Curry, 592 Gladstone Ave., Ottawa. (c20m)

ONE 23-FOOT GAP LATHE, 30" OVERSHEARS. One 20" Back Geared Drill. Apply The Vulcan Co., Ltd., London, Ont. (c22m)

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WANTED AGENCY OF SPECIALTIES FOR hardware trade, factories, and mills, for Quebec City and district. Best connections and references. Reply to G. A. Vandry, 28 St. Joseph St., Quebec. (c21m)

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BRANTFORD PATTERN WORKS ARE PREpared to make up patterns of any kind including pattern works to sketches, blue prints or sample castings. Prompt, efficient service. Bell 'Phone 671 Machine 'Phone 733. Brantford Pattern Works, 49 George St., Brantford, Ont. (ctfm)

Mining Machinery for Sale

Alley & McLellan Air Compressor 600 ft. at 100 lbs. pressure, 125 H.P. Motor, heavy duty 600 R.P.M. 3 phase 60 cycle 550 volts.
Ingersoll-Rand 800 ft. Air Compressor.
1 Tube Mill Fraser & Chalmers 5 x 22.
1 Power & Mining 5 x 22.
Also large assortment of Pumps, Tanks, Classifiers, Boilers and Mining Equipment for sale.

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Free Turning

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30,000 lbs... .250"	¼"
24,500 lbs... .533"	Abt. .17/32"
62,500 lbs... .625"	⅝"
73,250 lbs... .750"	¾"
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45,000 lbs...1,250"	1¼"
26,000 lbs...1.375"	1⅜"
39,000 lbs...2.000"	2"

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2—60" Bullard Vertical Boring Mills
1—60" Niles Vertical Boring Mill
No. 4—B. & S. Plain Miller
1—36" x 36" x 8' Gray Planer, two heads
No. 3—Cincinnati Universal Miller
5—No. 0 Steptoe Hand Millers
13" x 5' 6" New Carroll-Jamieson Quick-Change Lathe
14" x 6' New Carroll-Jamieson Quick-Change Lathe
15" x 6' New Sidney D.B.G. Quick-Change Lathe, swing 17"
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33" x 14' Putnam, arranged for Motor Drive
6' Western Radial Drill
5' Bickford Single Pulley Drive Radial
100-lb. New Little Giant Hammer
50-lb. New Little Giant Belt Hammer
25-lb. New Little Giant Belt Hammer
30-ton Watson & Stillman Hydraulic Press

FRANK TOOMEY INC.
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SPECIALISTS
in
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Daniel's P.P.P. Packing.
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Pump Valves.
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Plastic Metallic Packing for Piston Rods and Valve Stems.
Paxton & Mitchell Locomotive Rod Packing.
Rapid Hose Coupler, for all Hose Connections.

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International Machinery and Supply Company, Limited
421 St. James St., Montreal

A Little Act of Courtesy That is Good Business

BY simply mentioning CANADIAN MACHINERY when writing to our advertisers you will be doing something which will prove of three-fold benefit.

First—It will benefit you because it enables the advertiser to immediately associate your enquiry with the product advertised, resulting frequently in quicker service.

Second—It will benefit the advertiser because it enables him to identify and classify enquiries and to give credit where credit is due.

Third—It will benefit **your** paper because in the records of the advertiser it will receive the credit for your enquiry, instead, perhaps, of some less deserving medium.

We are always grateful for favors of this kind. It costs the reader nothing, and yet as we said before, it is of three-fold benefit.

MACGOVERN & COMPANY INCORPORATED POWER MACHINERY

HORIZONTAL RETURN TUBULAR BOILERS

Quan.	Size	H.P.	Make	Pressure
1	60" x 14'	70		80 lbs.
1	60" x 14'	70	JOHN INGLIS	85 lbs.
1	60" x 16'	85	GOLDIE & McCULLOCH	120 lbs.
1	60" x 16'	100	GOLDIE & McCULLOCH	100 lbs.
1	60" x 16'	100		75 lbs.
2	66" x 14'	100		85/110 lbs.
2	66" x 15'	100		
1	66" x 16'	100	MURRAY IRON WORKS	125 lbs.
1	72" x 18'	125	STEWART	140 lbs.
1	72" x 14'	125	GOLDIE & McCULLOCH	125 lbs.
1	72" x 21'	125	DILLON	125 lbs.
4	72" x 16'	135		80/100 lbs.
2	72" x 18'	150		135 lbs.
2	72" x 18'	150	BROWNELL	150 lbs.
1	72" x 18'	150		150 lbs.
1	72" x 18'	170	STEWART	140 lbs.
1	72" x 20'	170	KEELER	125 lbs.
1	72" x 18'	198	ROBB MUMFORD	125 lbs.
2	72" x 18'	216	[illegible]	105 lbs.
1		250	KEELER	105 lbs.

WATER TUBE BOILERS

Quantity	H.P.	Make	Type	Pressure
1	100	BABCOCK & WILCOCX		200 lbs.
1	125	HEINE		125 lbs.
1	150	ROBB ENGINEERING	straight [illegible]	125 lbs.
2	204	BABCOCK & WILCOX	vertical C.I.	160 lbs.
1	222	BABCOCK & WILCOX	[illegible] C.I.	160 lbs.
4	225	HEINE	[illegible]	160 lbs.
1	250	CAN. FOUNDRY		160 lbs.
8	250	STERLING		160 lbs.
4	250	STERLING		150 lbs.
6	254	BABCOCK & WILCOX	steel	175 lbs.
2	300	CANADA FOUNDRY		120 lbs.
5	318	HEINE		160 lbs.
3	338	BABCOCK & WILCOX	C.I.	125 lbs.
4	350	BABCOCK & WILCOX		200 lbs.
1	350	HEINE		180 lbs.
3	350	HEINE		165 lbs.
2	360	ERIE	steel	150 lbs.
1	380	STERLING		153 lbs.
1	450	HEINE		180 lbs.
3	460	HEINE	forged steel	250 lbs.
2	500	ROBB		175 lbs.
2	500	BABCOCK & WILCOX		160 lbs.
1	500	GOLDIE & McCULLOCH	steel	200 lbs.
4	502	BABCOCK & WILCOX		200 lbs.
2	625	BABCOCK & WILCOX		200 lbs.
1	1063	EDGEMOOR		200 lbs.
3	1200	STERLING		225 lbs.

MacGOVERN & COMPANY, INC.
285 Beaver Hall Hill, - - - MONTREAL

United States Government Surplus Property For Sale

By Toronto District Salvage Board, Ordnance Department, U.S. Army.

Miscellaneous Machinery—Shop Equipment—Miscellaneous Tools—Electrical Equipment—Testing Equipment—Miscellaneous Hardware, etc.

Comprising

MISCELLANEOUS MACHINERY

Lathes—Millers—Grinders—Shapers—Planers—Presses—Boring Mills—Drillers—Sand Blasts—Screw Machines—Thread Millers—Varnishing Machines—Hack Saws—Forging Equipment—Centering Machines, Etc.

SHOP EQUIPMENT

Forges—Furnaces—Blowers—Air Compressors—Accumulators—Pumps—Trucks—Shafting—Tanks, Oil—Tanks, Quenching—Tanks, Storage—Scales—Welding Equipment—Cranes—Hoists—Pulleys—Blowers—Chain Blocks—Vises—Conveyors—Runways — Belting — Miscellaneous Hardware—Etc.

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Boring Bars—Chucks—Reamers—Tool Holders—Twist Drills—Taps and Dies—Micrometers—Etc.

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Generators—Motors—Transformers—Switch Boxes—Miscellaneous Supplies—Etc.

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Pyrometers—Testing Machines—Brinell Machines—Etc.

Information regarding above may be obtained by applying to

Chairman, Sub-Committee on Buildings and Equipment
District Salvage Board, Ordnance Department

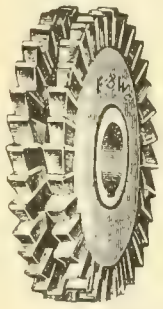
39 ADELAIDE STREET EAST TORONTO, ONTARIO

SPECIAL MACHINERY

Special Machinery, Jigs, Fixtures, Punches and Dies, Small Tools, Screw Machine Products, Gauges, Forgings, Etc.

CONTRACT WORK

Elliott & Whitehall Machine & Tool Co.
GALT, ONTARIO, CANADA
MILLING CUTTERS AND SMALL TOOLS



We manufacture the following tools, etc.

Standard and Special Milling Cutters of all descriptions, Gear Cutters, Hand Reamers, Shell Reamers, Chucking Reamers and Taper Pin Reamers, Lathe Mandrels and Arbors, Metal Stamping Dies, Gauges, Jigs and Fixtures, Etc.

All equipment required for rapid and economical production of interchangeable parts. Prompt attention to all work.

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"LITTLE GIANT"
Taps, Dies and Screw Plates
HIGH SPEED
Cutters, Reamers and Drills
All in Stock Here
"Service is Our Motto"
The J. A. M. Taylor Tool Co.
Machine Shop Supplies
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VICTORIA Special Machinery
DESIGNS PATTERNS
CASTINGS FORGINGS
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Victoria Foundry Co., Limited, Ottawa, Canada

THE FELLOWS GEAR SHAPER
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The REGO 100% Efficient Welding Torch
Saves Oxygen Eliminates Flash-Back Better Welding
Write to us for anything and everything you need.
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ST. LAWRENCE WELDING CO., Ltd.
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WE CAN WELD ANYTHING ANYWHERE

BATH Universal Manufacturing Grinders
built by
Universal Grinding Machine Company
Fitchburg, Mass. U. S. A.

FITCHBURG

Plain Cylindrical Grinders

Built by
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FITCHBURG, MASS., U.S.A.

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LIMITED

ESTABLISHED 1847 TORONTO, ONTARIO 19 VICTORIA STREET

We Solicit Your Orders and Enquiries for

Foundry, Factory and Ship Building

Tools and Supplies, etc.

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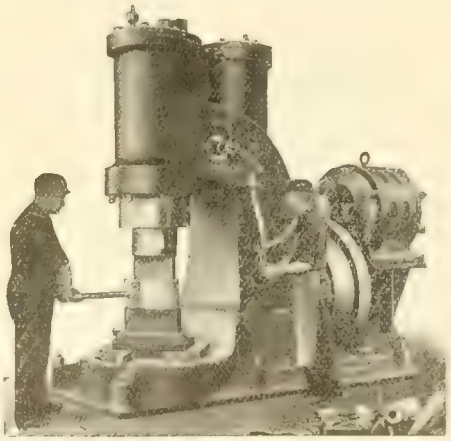
The Nazel Air Hammer
(A Self-Contained Unit)

Noted for Its Blow and Control



The Most Modern Reliable Power Driven Substitute for the Steam Hammer.

Built in 3 types, 6 sizes, arranged for belt or direct motor drive, with capacities up to 7" square for all manner of jobbing, manufacturing and certain classes of die forging. Write for catalogue.

Nazel Engineering & Machine Works

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SILVER'S
20 in. Drills

A STRONG, speedy, dependable drill, simple to operate. Made in 4 distinct styles with round or square base, and in gangs of 2, 3, or 4 spindles.

DRILLS THAT SATISFY

SILVER Salem, Ohio, U.S.A.

Silver's

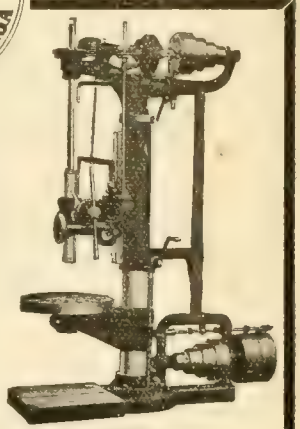
25-inch Drills

These drills embody many features that insure a big output of high-class work, and like our 20-inch drills, are adapted for any work demanding speed and accuracy.

Ask For Catalog

The Silver Mfg. Co.

290 Broadway, SALEM, OHIO



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Announcing

the issuance of a new catalog of prime interest to all users of milling and gear cutters and small tools. Herein you will find listed styles and sizes of end mills (special and plain) T-slot cutters. Key cutters, thread mills, gear slots—in fact your needs in the small tool line of this class are sure to be covered. Get your copy and note its completeness.
If your special requirement doesn't appear, Bilton can produce it—and in true Bilton Quality.

Just sign your name and address on a card and post it to

The Bilton Machine Tool Company
Housatonic Ave., Bridgeport, Conn.

STEEL PLATE WORK

BOILER BREECHINGS
SMOKESTACKS, STAND PIPES
TANKS, BINS, HOPPERS
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STRUCTURAL STEEL WORK

Machine work of all descriptions. Send us your specifications.

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Peterboro, Ontario, Canada

DIAMOND TOOLS
FOR TRUEING GRINDING WHEELS

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THE JOYCE-KOEBEL COMPANY, INC.
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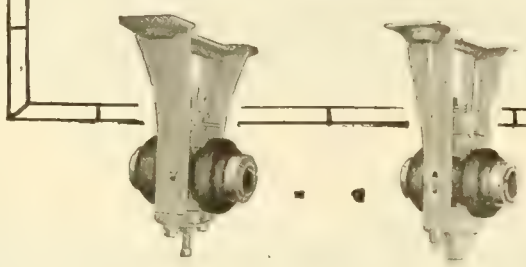
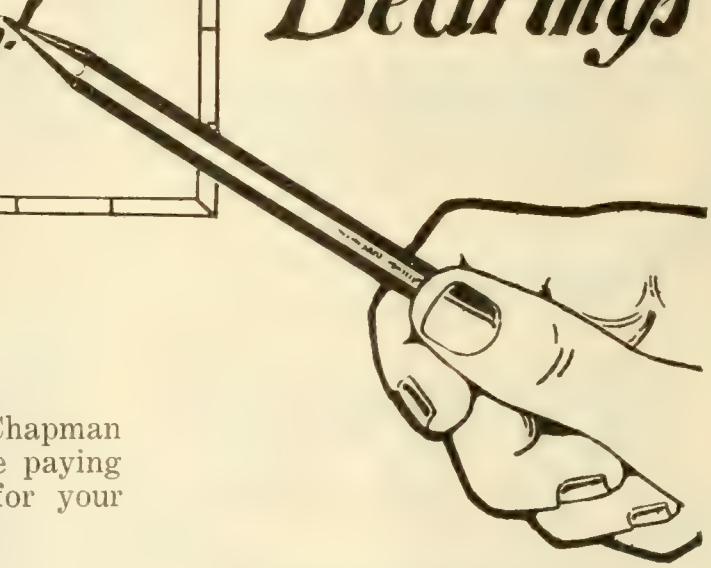
Chapman

Double Ball Bearings

You are paying for them even though you may not have them!





UNLESS you have bearings of the Chapman Double Ball Bearing type you are paying for them without getting anything for your money.

You are paying for them

—in power lost through friction, common to ordinary bearings.

—in lubrication expense, which includes the cost of oil and wages.

—in costly delays caused by hot boxes.

—in expensive rebabbitting.

Can you afford to delay installing Chapman Bearings in your plant in view of these facts?

Chapman Double Ball Bearings Save 15% to 40% of Your Total Power Cost.

Save 95% in Lubrication.

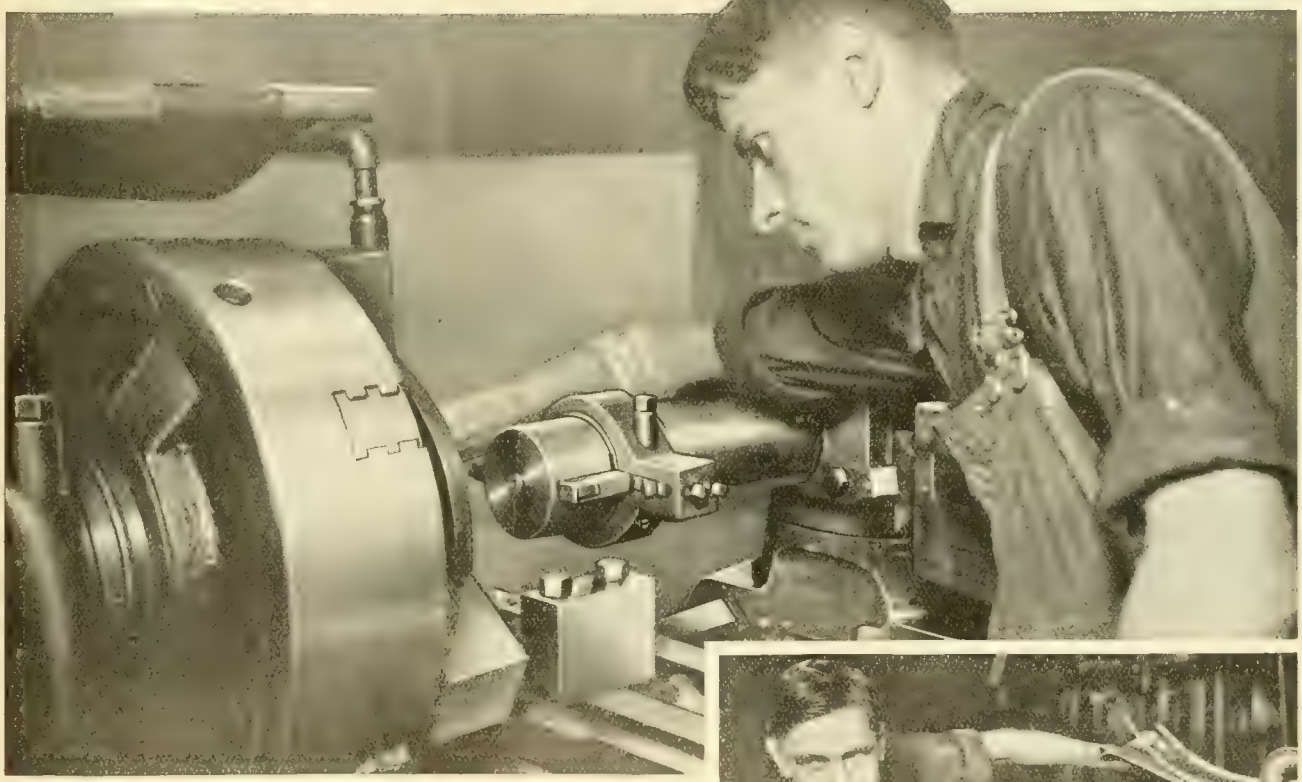
No Hot Boxes—No Rebabbitting
Dust Proof—Dirt Proof
Drip Proof.

The Chapman Double Ball Bearing Company
of Canada, Limited

339 Sorauren Ave. TORONTO, CANADA

TRANSMISSION BALL BEARING CO., Inc., 1050 Military Rd., Buffalo, N.Y.

KELLY PRODUCTION TOOLS



KELLY REAMERS

Reduce Spoilage 99 Per Cent

A large New York State gear manufacturer had been using Kelly Reamers for only three weeks when he permitted us to take these photos. In that time they had reduced spoilage on large gear bores just 99 per cent.

Production was interesting also. One large Kelly Roughing Reamer was removing 7/16″ on the diameters of steel gears. It stood up over a period of five days and four nights, machining in all 4,950 gears without need of resharpening. The Kelly Finishing Reamer for the same job removed 0.020″ with a tolerance of plus or minus 0.001″, and stood up for a similar length of time.

This company is now using Kelly Reamers on practically all turning machines. And the Kelly Service Man is regularly on the job to see that these tools are giving all they were built for. **Write for Catalog J-3.**

THE KELLY REAMER CO., CLEVELAND, OHIO

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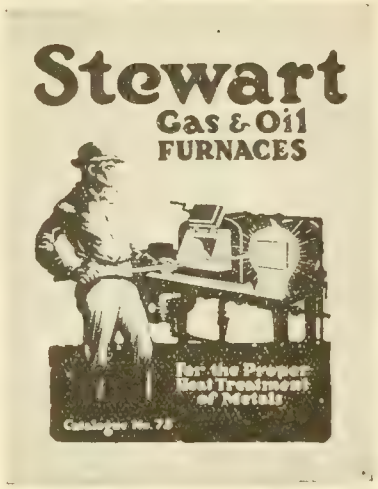


Stewart Furnaces Get Positive Results

CONTROL of temperature is the essential factor in the successful heat treatment of metals. If this control is not positive, the results are uncertain and unsatisfactory. Modern shop practice and steel heating requirements demand precision—every stage of the operation must be predetermined and definite—no "guess work" goes.

Stewart Furnaces guarantee positive temperature control, with positive results in quality and quantity of production. They are delivering reliable service in thousands of industrial plants throughout Canada and the United States. There could scarcely be more severe tests of heat treating furnaces than are met and successfully solved day after day by Stewart equipment in these plants.

You can put **your** heat treating problem up to Stewart Furnaces, and be assured that it will be done exactly as you require it. You run no risk in trusting Stewarts with your expensive dies, tools and parts or other material.

More than a hundred standard types and sizes designed for modern heat treating. If none of these meet your requirements, we will build one that will. The co-operation of our expert furnace engineers is at your service.

New Catalogue of the Stewart Line of Furnaces soon to be ready

Eighty large size pages giving features of Stewart furnace construction, and showing in detail the complete line of Stewart Furnaces, Forges and Heat Treating Equipment.

A number of our specially built Forges for unusual uses are shown in this catalogue.

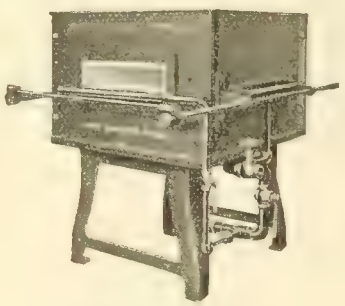
Two new lines of Oven Furnaces and Cylindrical Furnaces for High Speed Steel are described and illustrated for the first time.

Valuable heat treating information. An attractively printed, effectively illustrated book you will want for reference.

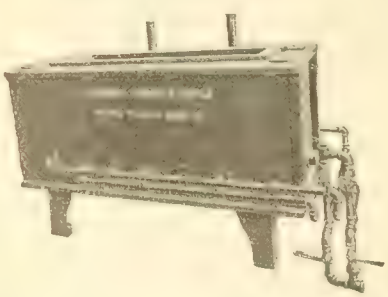
Mail a request on your letterhead.

Chicago Flexible Shaft Company

1148 SOUTH CENTRAL AVE., CHICAGO, ILL., U.S.A.



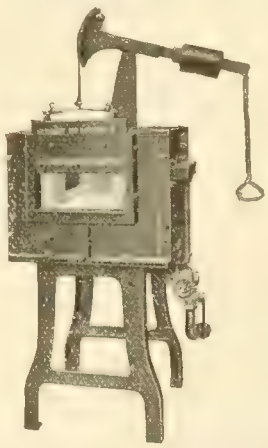
Stewart Drop Hammer Forge
Eight regular sizes.



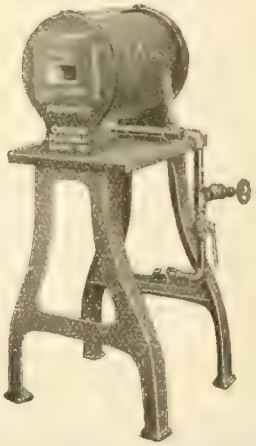
Stewart Tinning Furnace.
Seven regular sizes.

For High Speed Steel Hardening

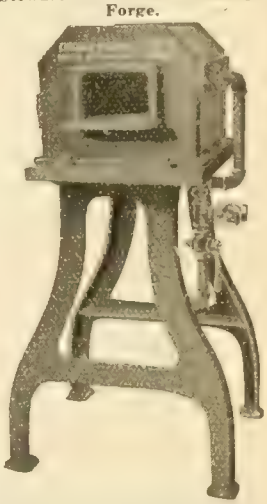
Stewart No. 14H Oven Furnace. Under and over fed.



No. 3 High Speed Steel Furnace.



Stewart No. 0 Tool Dressing Forge.



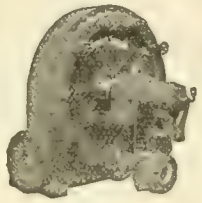
Sturtevant (TRADE MARK)

SYSTEMS

Planing Mill Fan

No. 2 Vacuum Cleaner

Autoforce Ventilator

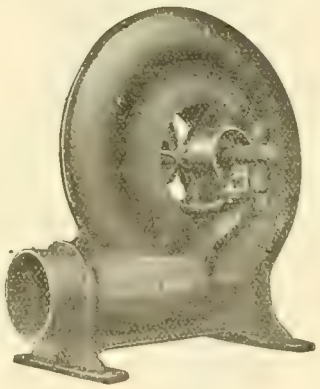

Steam Turbine

Sturtevant (TRADE MARK)

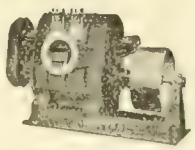
STEEL PRESSURE BLOWERS

Electric Propeller Fan

Medium Pressure Blower



Low Pressure Blower


High Pressure Blower

Volume Blower and Exhauster

Gasolene Generating Set

For All Purposes

THO designed originally for supplying air to cupolas and forges Sturtevant steel pressure blowers are now used for all purposes where pressures up to 16 ounces to the square inch are to be maintained; and where air is to be forced for long distances. Regularly built with horizontal discharge but can be readily made for down blast or up blast. Built in all sizes and may be belt, motor, engine, or turbine driven. Operating and upkeep cost is remarkably low as proven by actual performance in many long term (30 years and more) installations. Design and construction are typically Sturtevant -supreme! Blast wheel is made of refined steel and galvanized to prevent rust. Wheels are accurately balanced and run smoothly when driven at high speed. Bearings are each cast in one piece and are lined with highly durable non-heating white metal. Write for catalogue.

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Galt, Ontario

Sales Office: Toronto,
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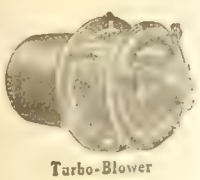
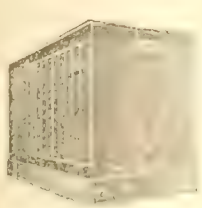
Direct Current Motor


Turbo-Blower


Type H Air Washer

Fan Engines

Sturtevant (TRADE MARK)

PRODUCTS

VS-7 Steam Engine

Heater

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McCrosky

McCrosky WIZARD Quick-Change Chucks and Collets

WIZARD production is continuous output on many jobs. On any job they will pay their own cost in a short time.

The tools are changed in rapid succession, without stopping the spindle for a moment and while running at any speed. Will more than double your drill-press in one continuous operation.

With the WIZARD you can drill, ream, counterbore, tap, set studs, etc.

Think what it means to turn out completed jobs with only one handling of the work. It means cutting out costly lost motion which eats up your profits. It means that a WIZARD outfit enables a girl to do more and better work than two men, the old way.

It means keeping your plant busy when the less efficient plant is having a hard time to make ends meet.

Read the full story of the WIZARD and other McCrosky Cost Cutting Tools in Efficiency Book No. 6. Yours on request.

McCrosky Tool Corporation
(Formerly McCrosky Reamer Co.)
Meadville, Pa.
Detroit Keyseat Bldg., Mr. C. M. Smith, Mgr.
Export Manager:
B. Whittaker, 21 State St., New York

COST CUTTING TOOLS

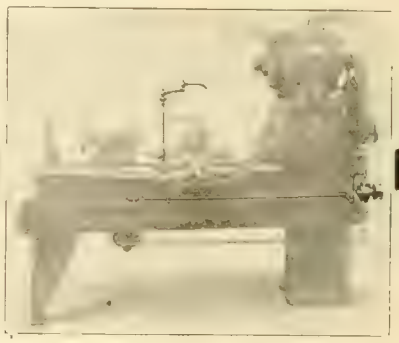
TRAHERN
Lubricating Pumps

are rotary geared because experience has proven this construction to be the most practical for machine tool use.

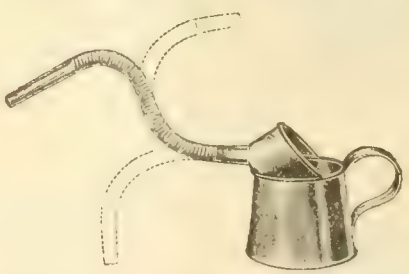
Hundreds of machine tool manufacturers throughout the United States and Canada furnish Trahern pumps as regular equipment on their product.

A good oil pump will help sell your product and will intrench its reputation.

TRAHERN PUMP DIV.
Geo. D. Roper Corporation
ROCKFORD, ILL. - - U.S.A.



Say Good-bye to Funnels Use this "ALL-WAY" Oiler



Combination Filler and Funnel

This Filler eliminates the necessity of the use of a separate Funnel. With the Flexible Spout any part can be readily reached.

Saves much inconvenience and avoids dripping of oil.

If your dealer cannot supply you, write us.

We also manufacture the well-known "All-Way" Oil can. Saves you 50% of your oil bill.

THE ALL-WAY OILER MFG. COMPANY
196 King St. West Toronto, Ont.

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DUNBAR SPRINGS

ACCURACY ASSURED

You can always depend upon Dunbar Springs being accurate. Before proceeding with any order the first few springs are carefully tested and checked up for this very purpose.

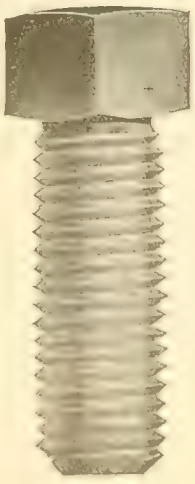
Seventy-two years' experience making flat and spiral springs of every description enables us to furnish you with springs of the highest quality, that can be depended upon under all conditions.

Send blue prints for estimates.

The Dunbar Brothers Co.

BRISTOL, CONN

ACCURACY



When you want Cap and Set Screws and Semi-finished or Finished Hexagon Nuts for your rush jobs send your order to us. Prompt service with accurate goods.

THE
GALT MACHINE SCREW CO., LIMITED
GALT, ONTARIO

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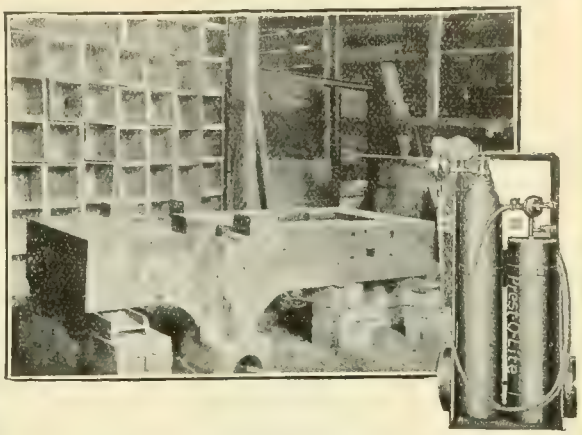
Oxy-Acetylene Welding and Cutting



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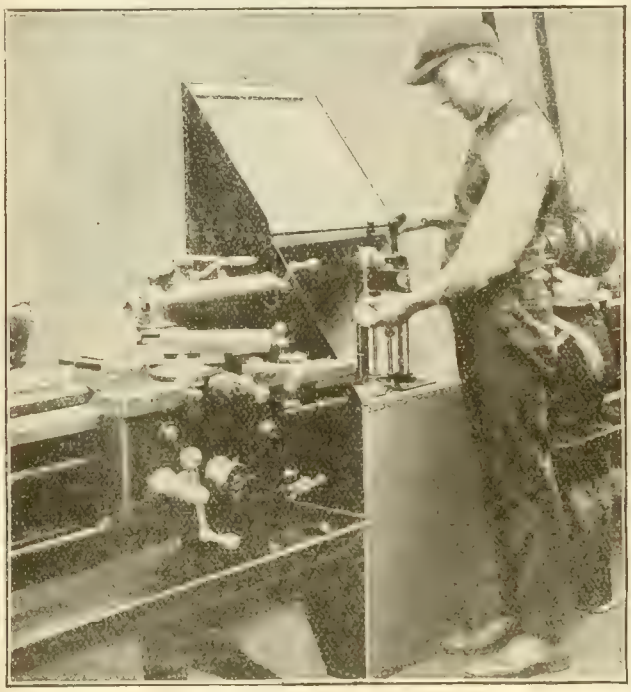

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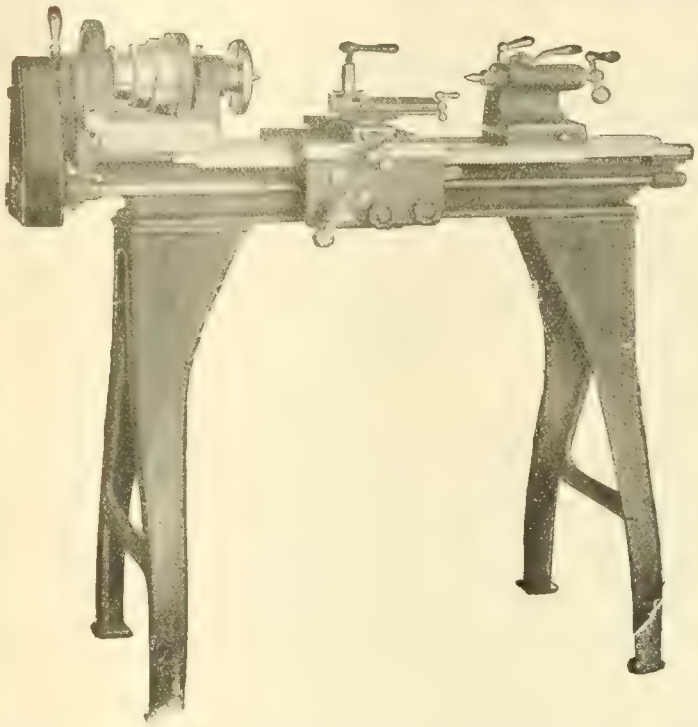

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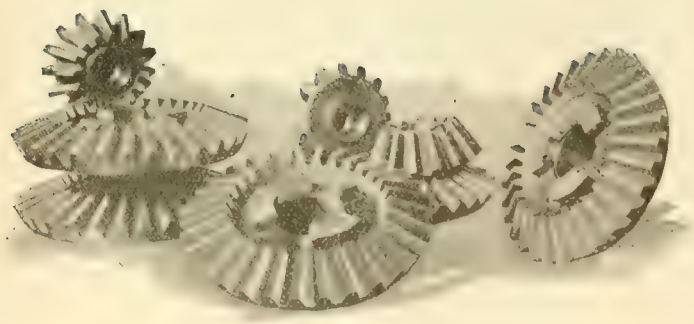

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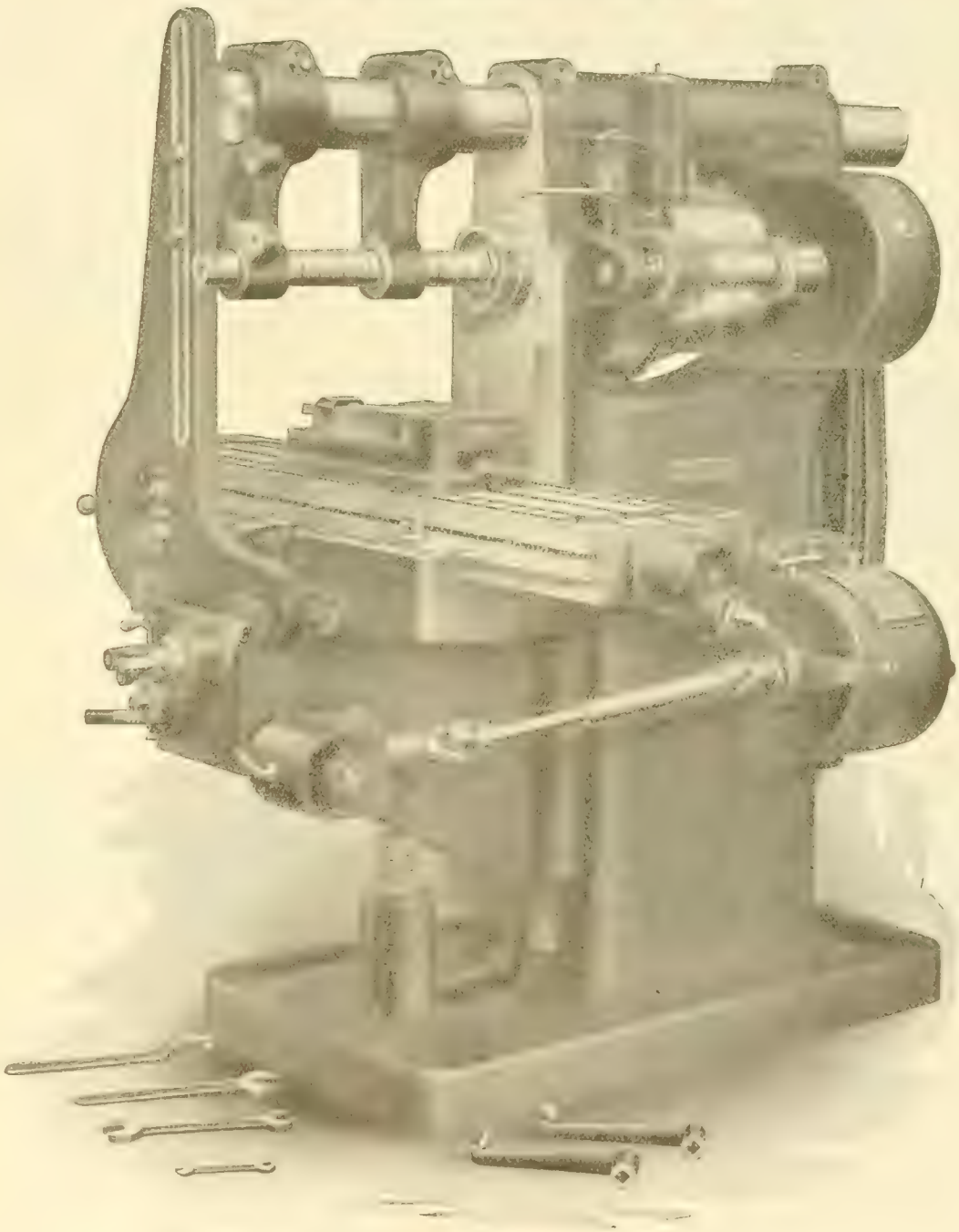

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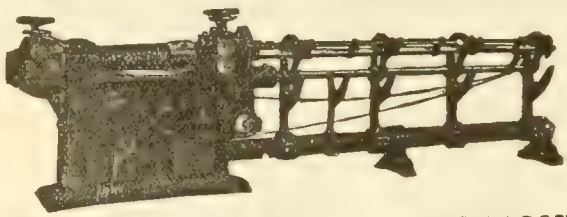

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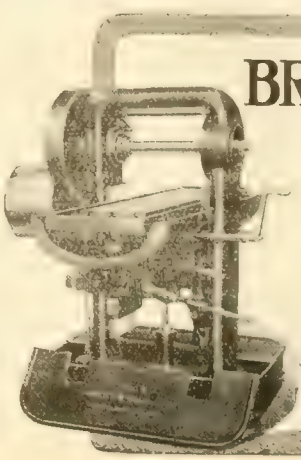

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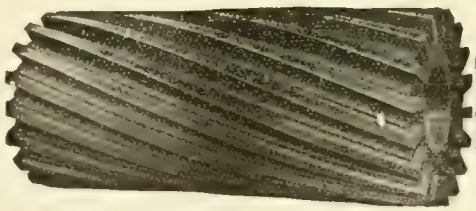

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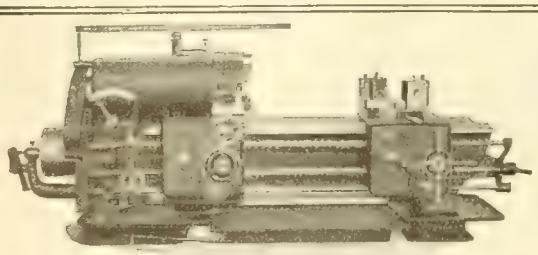

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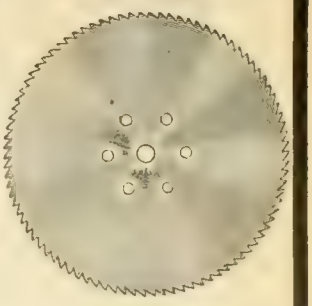

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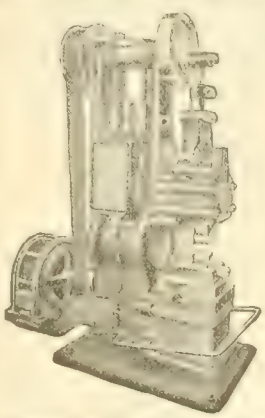

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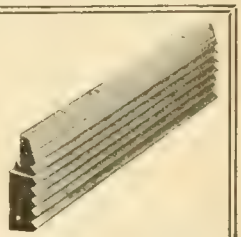

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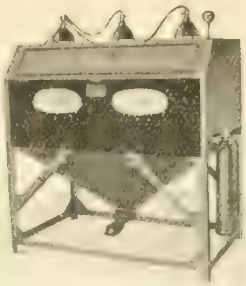

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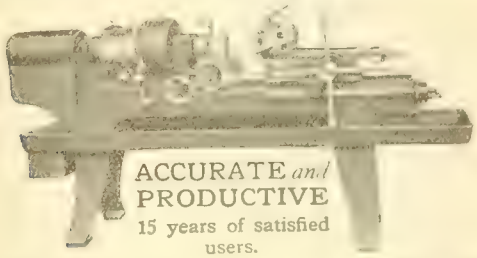

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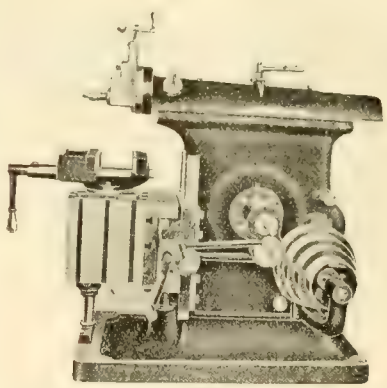

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ACETYLENE
Carter Welding Co., Toronto, Ont.
Prest-O-Lite Co., Inc., Toronto, Ont.
Union Carbide Co., Toronto, Ont.
Welding & Supplies Co., Montreal, Que.

ACETYLENE GENERATORS
Davis-Bournonville Co., Jersey City, N.Y.
Prest-O-Lite Co., Inc., Toronto, Ont
Welding & Supplies Co., Montreal, Que.

ACORN DIE AND HOLDERS
Greenfield Tap & Die Corp., Greenfield.
Wells Bros. of Canada, Galt, Ont.

ACCUMULATORS, HYDRAULIC
Canadian Fairbanks-Morse Co., Montreal
Garlock-Walker Mach'y. Co., Toronto.
Metalwood Mfg. Co., Detroit, Mich.
Niles-Bement-Pond Co., New York.
Williams & Wilson, Ltd., Montreal.

AIR COMPRESSORS
See Compressors.

AIR CONDITIONS, DEHUMIDIFYING—HUMIDIFYING
B. F. Sturtevant Co, Galt, Ont.

AIR CYLINDERS
Smalley-General Co., Bay City, Mich.

AIR RECEIVERS
Can. Ingersoll-Rand Co., Sherbrooke, P.Q.
Dominion Bridge Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
St. Lawrence Welding Co., Montreal
Williams & Wilson, Ltd., Montreal.
Welding & Supplies Co., Montreal, Que.

AIR WASHERS
Can. Blower & Forge Co., Kitchener.

ALUMINUM
Canada Metal Co., Toronto.
Tallman Brass & Metal Co., Hamilton.
Williams & Wilson, Ltd., Montreal.

ALLOY, STEEL
Armstrong, Whitworth of Can., Montreal.
Blancke Co., L. C., New York City.
Boker & Co., Inc., H., Montreal, Que.
Firth & Sons, Thos., Montreal, Que.
General Steel Co., Milwaukee, Wis.
Hawkridge Bros. Co., Boston, Mass.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.
Pilot Steel & Tool Co., Montreal, Que.
Swedish Steel & Importing, Montreal.
Vanadium Alloys Steel Co., Pittsburgh.
Vulcan Crucible Steel Co., Aliquippa, Pa

ANCHORS
Fellows Bros., Ltd., Chadley Heath, Eng.

ARBORS
Brown & Sharpe Mfg. Co., Providence, R.I.
Canadian Fairbanks-Morse Co., Montreal
Cleveland Twist Drill Co., Cleveland.
Ford-Smith Machine Co., Hamilton, Ont.
Wilson & Co., J. C., Belleville, Ont.
Garlock Walker Machinery Co., Toronto
Morse Twist Drill & Mach. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.
Whitman & Barnes Mfg. Co., Akron, O.
Williams & Wilson, Limited, Montreal

ARCHITECTURAL IRON
Page Steel & Wire Co., Adrian, Mich.

ARRESTERS, DUST
Northern Crane Wks., Walkerville, Ont.
Pangborn Corporation, Hagerstown, Md.

AUTOGENOUS WELDING AND CUTTING PLANTS
Carter Welding Co., Toronto, Ont.
Davis-Bournonville Co., Jersey City, N.Y.
Prest-O-Lite Co., Inc., Toronto, Ont.
St. Lawrence Welding Co., Montreal
Welding & Supplies Co., Montreal, Que.

AUTOMATIC MACHINERY
Baird Machine Co., Bridgeport, Conn.
Davis-Bournonville Co., Jersey City, N.Y.
Garlock Walker Machy. Co., Toronto.
Gardner & Son, Robert, Montreal
National Acme Co., Cleveland, Windsor
Pratt & Whitney Co., Dundas, Ont.
Rockefeson Machine & Tool Co., Toronto.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que

AUTOMATIC METAL CUTTING-OFF MACHINES
Greenfield Tap & Die Corp., Greenfield.
Wells Bros., of Can., Galt, Ont.
Aikenhead Hardware Co., Toronto, Ont.
Canadian Fairbanks-Morse Co., Montreal
Canada Metal Co., Toronto.
G. F. Foss Mchy. & Sply. Co., Montreal.

AUTO SHEET METAL MACHINERY
Quickwork Co., St. Marys, Ohio.

AUXILIARY HEADS
Hoefer Mfg. Co., Freeport, Ill.

BABBITT METAL
Canada Metal Co., Ltd., Toronto, Ont.
Hoyt Metal Co., Ltd., Toronto.
Magnolia Metal Co., Montreal.
Rice Lewis & Son, Toronto, Ont.
Tallman Brass & Metal Co., Hamilton.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Limited, Montreal.

BAND SAWS
Oliver Machy. Co., Grand Rapids, Mich.

BALL BEARINGS
Canadian Fairbanks-Morse Co., Montreal
Can S K F Co., Toronto, Ont.
Chapman Double Ball Bearing Company, Toronto
The Gray Ball Bearing Co., Ltd., Toronto
Morrow Screw & Nut Co, John, Ingersoll
Rochester Ball Bearing Co, Rochester.
Williams & Wilson, Ltd., Montreal, Que

BALLS, STEEL
Atkins & Co., Ltd., Wm., Sheffield, Eng.
Blancke Co, L C, New York City.
Chapman Double Ball Bearing Co., Toronto
Boker & Co., Inc., Montreal, Que.
Gray Ball Bearing Co., Ltd., Toronto.
Rochester Ball Bearing Co., Rochester.
Marshall, Son & Bunney, Toronto.
Williams & Wilson, Limited, Montreal

BALLS, BURNISHING
Gray Ball Bearing Co. Ltd., Toronto.

BAROMETERS
Taylor Instrument Co., Rochester, N.Y.

BARRELS, SAND-BLAST
Pangborn Corp., Hagerstown, Md.

BARRELS, STEEL SHOP
Baird Machine Co, Bridgeport, Conn.
Cleveland Wire Spring Co, Cleveland.

BARRELS, TUMBLING
Baird Machine Co, Bridgeport, Conn.
Katie Foundry, Galt, Ont.
Northern Crane Works, Walkerville, Ont.
Wilson & Co., J. C., Belleville, Ont.
Williams & Wilson, Ltd., Montreal, Que

BASE FACING MACHINES
Victoria Foundry Co., Ottawa, Ont.

BARS, BORING
Gisholt Machine Co., Madison, Wis.
Niles-Bement-Pond Co., New York
Wilson & Co., J. C., Belleville, Ont.
Williams & Co., J. H., Brooklyn, N.Y.
Williams & Wilson, Ltd., Montreal, Que.

BARS, MERCHANT
Algoma Steel Corp., Sault Ste. Marie.

BARS, CONCRETE REINFORCING
Algoma Steel Corp., Sault Ste. Marie

BEADING MACHINES
Quickwork Co., St. Marys, Ohio

BELT CONVEYORS
Can. Link-Belt Co., Toronto, Ont.
Wilson & Co., J. C., Belleville, Ont.
Williams & Wilson, Limited, Montreal

BEARINGS, BRONZE
Wilson & Co., J. C., Belleville, Ont.

BEARINGS, DIE CAST
Franklin Mfg. Co., Syracuse, N.Y.

BELT-LACING MACHINES, HOOKS AND PINS
Clipper Belt Lacer Co., Grand Rapids

BELT LACING LEATHER
Aikenhead Hardware Co., Toronto, Ont.
G. F. Foss Mchy. & Sply. Co., Montreal
Graton & Knight Mfg., Worcester, Mass.
Rice Lewis & Son, Toronto, Ont.

BELTING, BALATA
Federal Engineering Co., Toronto, Ont.

BELT HOOKS, WIRE
Clipper Belt Lacer Co., Grand Rapids

BELTING, RUBBER
Can. Consolidated Rubber Co., Montreal.

BELTING, CHAIN
Can. Fairbanks-Morse Co., Montreal.
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal, Que.
Morse Chain Co., Ithaca, N.Y.
Whitney Mfg Co, Hartford, Conn.
Williams & Wilson, Ltd., Montreal, Que.

BELTING, CONVEYOR
Can. Consolidated Rubber Co., Montreal.
Baxter & Co., Ltd., J. R., Montreal.
Canadian Fairbanks-Morse Co., Montreal
Federal Engineering Co., Ltd., Toronto.
Graton & Knight Mfg., Worcester, Mass.
Jones & Glassco, Montreal, Que.
McLaren Belting Co, J. C., Montreal.
Morse Chain Co., Ithaca, N.Y.
Plewes, Ltd., Winnipeg, Man.
Rice, Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Montreal.
Williams & Wilson, Ltd., Montreal, Que.

BELTING, FRICTION AND SURFACE
Can. Con. Rubber Co., Ltd., Montreal.

BELTING, LEATHER
Can. Graton & Knight Mfg. Co., Montreal
John Tullis & Son, Glasgow, Scotland.

BELTING, WOVEN
Federal Engineering Co., Ltd., Toronto

BENDING ROLLS, PLUTE & AUGH
Wickes Bros., Saginaw, Mich.

BENDING MACHINERY
Bertrams, Ltd., Edinburgh, Scotland.
Bertram & Sons Co, John, Dundas
Brown-Boggs Co, Ltd, Hamilton, Ont.
Can Blower & Forge Co, Kitchener.
Garlock-Walker Mach Co, Toronto.
Williams & Wilson, Ltd., Montreal.

BLAST GATES
W. S. Rockwell Co., New York, N.Y.

BLASTING MACHINES, SAND
Garlock-Walker Machinery Co., Toronto.
Jardine, A. B., & Co., Hespeler, Ont.
National Mach Co, Tiffin, Ohio.
Niles-Bement Pond Co., New York.
Toledo Machine & Tool Co., Toledo.
Williams & Wilson, Limited, Montreal.

BILLET MARKERS
Matthews & Co, Jas. H., Pittsburgh, Pa.

BILLETS
Atkins & Co, Ltd., Wm., Sheffield, Eng.
Swedish Steel & Importing Co., Ltd., Montreal
Algoma Steel Corp., Sault Ste. Marie.
Kayser Ellison & Co, Ltd., Montreal.
Marshall, Son & Bunney, Toronto
Norton, Ralph B., Agent, Montreal.

BILLETS, FORGING
General Steel Co, Milwaukee, Wis.
Kayser Ellison & Co, Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.

BINS, STEEL
Dominion Wire & Iron Works, London, Ont
Dominion Bridge Co, Montreal, Que.
MacKinnon Steel Co, Sherbrooke, Que.
Toronto Iron Works, Ltd, Toronto, Ont.
William Hamilton Co., Peterboro, Ont.

BLACKSMITH WORK
The Thos. Pink Co., Ltd., Pembroke

BLASTING MACHINES, SHOT AND STEEL GRIT
Pittsburgh Crushed Steel Co., Pittsburgh

BLOOMS AND SLABS
Algoma Steel Corp., Sault Ste. Marie

BLOWERS
Can. Blower & Forge Co, Kitchener, Ont.
Garlock-Walker Machinery Co., Toronto.
MacKinnon & Co., Montreal, Que.
Williams & Wilson, Limited, Montreal.

BLOW PIPES AND REGULATORS
Carter Welding Co, Toronto, Ont
Prest-O-Lite Co, Inc, Toronto, Ont.
Welding & Supplies Co., Montreal, Que.

BLUE PRINTING MACHINERY
Commercial Camera Co., Providence, R.I.
Walker Bros., Saginaw, Mich.

BOARDS, GLASS CUTTING
Lufkin Rule Co., of Can., Windsor, Ont.

BOARTZ
Joyce, Koebel & Co., Inc., New York.

BOLT CUTTERS
Greenfield Tap & Die Corp., Greenfield. Mass

BOLT CUTTERS
Fellows Gear Shaper Co., Springfield, Vt.
Greenfield Tap & Die Corp., Greenfield. Mass.
Wells Bros., of Can., Galt, Ont.
Williams & Wilson, Ltd., Montreal, Que.

BOOKS, TECHNICAL
MacLean Publishing Co., Toronto.

BOILERS
Dominion Bridge Co., Montreal, Que.
MacGovern & Co., Montreal, Que.

BOILER BREECHINGS
William Hamilton Co., Peterboro, Ont.

BOLT CUTTERS AND NUT TAPERS
Aikenhead Hardware Co., Toronto, Ont.
Canadian Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto.
Landis Machine Co., Waynesboro, Pa.
A.B. Jardine & Co., Ltd., Hespeler, Ont.
Rice Lewis & Son, Toronto, Ont.
Wells Bros. Co. of Canada, Galt, Ont.
Williams & Wilson, Limited, Montreal.

BOLTS
Aikenhead Hardware Co, Toronto, Ont.
London Bolt & Hinge Wks., London, Ont.
Morrow Screw & Nut Co., John, Ingersoll.
Rice, Lewis & Son, Toronto, Ont.
Steel Co., of Canada, Ltd, Hamilton.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Co.,, J. H. Brooklyn, N.Y.

BOLTS, COUPLING
Galt Machine Screw Co., Ltd., Galt, Ont.

BOLTS, STAY
Morrow Screw & Nut Co., John, Ingersoll.

BOLTS, SPRING SHAKLE
Can. Winkley Co., Ltd., Windsor, Ont.
Morrow Screw & Nut Co., John, Ingersoll.

BOLTS, PATCH
Morrow Screw & Nut Co., John, Ingersoll.

BOLT AND NUT MACHINERY
Bertram & Sons Co., John, Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co, Toronto.
Gardner & Son Robt., Montreal.
Landis Machine Co., Waynesboro, Pa.
National Acme Co, Cleveland, Ohio.
National Machinery Co, Tiffin, Ohio.
Williams & Wilson, Ltd, Montreal, Que.
Williams Machinery Co, A. R, Toronto

BOLT THREADING MACHINERY
Jardine & Co, Ltd., B., Hespeler.
Landis Machine Co, Waynesboro, Pa.
National Acme Co, Cleveland, Ohio.
Victor Tool Co, Waynesboro, Pa.
Williams & Wilson, Limited, Montreal.

BORING MACHINES, PNEUMATIC CYLINDER
Cleveland Pneumatic Tool Co., Toronto.
Canadian Fairbanks-Morse Co., Montreal
Can. Ingersoll-Rand Co., Sherbrooke Que
Garlock Walker Mach Co., Toronto

BORING MACHINES, UPRIGHT AND HORIZONTAL
Bertram & Sons Co., John, Dundas.
Betts Machine Co., Rochester, N.Y.
Canada Machinery Corp., Galt, Ont.
Garlock Walker Machinery Co., Toronto
Oliver Mach'y Co., Grand Rapids, Mich.
Gisholt Machine Co., Madison, Wis.
Hoefer Mfg. Co., Freeport, Ill.
Landis Tool Co., Waynesboro, Pa.
Niles-Bement-Pond Co, New York.
Rockefeson Machine & Tool Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que

BORING AND TURNING MILLS
Bertram & Sons Co., John, Dundas.
Betts Machine Co., Rochester, N.Y.
Canada Machinery Corp., Galt, Ont.
Gisholt Machine Co., Madison, Wis.
Foss Mch. & S'ply Co., Geo. F., **Montreal**
Oliver Mach Co., Grand Rapids, **Mich.**
Niles-Bement-Pond Co., New York.

BUYERS' DIRECTORY

BOXES, CAST IRON
Brown & Sharpe Mfg. Co., Providence, R.I.

BOXES, STEEL SHOP AND TOTE
Cleveland Wire Spring Co., Cleveland

BRAKEBAND LINING CUTTERS
Peck, Stow & Wilcox Co., Southington, Conn.

BRAKES
Brown, Boggs & Co., Hamilton, Can.
Electric Steel & Metals, Ltd., Welland.

BRASS AND COPPER BARS, RODS BRAKES, CORNICES
Peck, Stow & Wilcox Co., Southington, Conn

BRASS FOUNDERS
Canada Metal Co., Toronto
Greenleafs Ltd., Belleville, Ont.
St. Lawrence Welding Co., Montreal.
Tallman Brass & Metal Co., Hamilton.
Wilson & Co., J. C., Belleville, Ont.

BRASS WORKING MACHINERY
Foster Machine Co., Elkhart, Ind.
Garlock-Walker Machinery Co., Toronto
Warner & Swasey Co., Cleveland, O.
Niles Bement-Pond Co., New York.
Prest-O-Lite Co., Inc., Toronto, Ont.
Wood Turret Machine Co., Brazil, Ind.
Williams Machy. Co., A. R., Toronto
Williams & Wilson, Ltd., Montreal, Que.

BRICKS, FIRE
Harbison-Walker Refractories, Montreal.

BRIDGES, RLY. AND HIGHWAY
Dominion Bridge Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.

BRONZE RODS AND SHEETS, PLATES
Brown's Copper & Brass Rolling Mills, New Toronto

BRONZE, NAVAL
Brown's Copper & Brass Rolling Mills, New Toronto.
Canada Metal Co., Toronto
Tallman Brass and Metal Co., Hamilton.

BRONZE COPPER
Canada Metal Co., Toronto.

BUFFING AND POLISHING MACHINERY
Ford-Smith Mach. Co., Hamilton.
Foss Machy. & S'ply Co., Geo. F. Montreal
Garlock-Walker Machinery Co., Toronto.
Williams & Wilson, Limited, Montreal.

BUCKETS, DUMP
MacKinnon Steel Co., Sherbroooke, Que.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

BUCKETS, ELEVATOR
Can. Link-Belt Co., Toronto, Ont.
MacKinnon Steel Co., Sherbrooke, Que.

BUCKETS, CLAM SHELL, CRAB, DUMP
Can. Link-Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Ltd, Walkerville.

BULLDOZERS
Bertram & Sons Co., John, Dundas.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto.
Williams & Wilson, Limited, Montreal.

BURNERS, OIL AND NATURAL GAS
Northern Crane Works, Ltd., Walkerville.
W. S. Rockwell Co., New York, N.Y.

BURRS, IRON AND COPPER
Parmenter & Bulloch Co., Gananoque,.

BUSHINGS, BRONZE
Morrow Screw & Nut Co., John, Ingersoll.

CALIPERS
Brown & Sharpe Mfg. Co., Providence, R.I.
Pangborn Corporation, Hagerstown, Md.
Peck, Stow & Wilcox Co., Southington, Conn

CABINETS, SAND BLAST
Pangborn Corporation, Hagerstown, Md.

CABLE, ELECTRIC
International Machinery & Supply Co., Ltd., Montreal, Que.

CALKS, BOOT
Lufkin Rule Co., of Can., Windsor, Ont.

CANADA SILVER SHEETS, ROLLS
Brown's Copper & Brass Rolling Mills, New Toronto.

CANNERS' MACHINERY
Bliss, E. W. Co., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Can.

CANNERS' CONVEYORS
Can. Link-Belt Co., Toronto, Ont.
Wilson & Co., J. C., Belleville, Ont.

CARBIDE
Union Carbide Co., Toronto, Ont.

CARBONIZING BOXES
Can. Driver-Harris Co., Ltd., Walkerville
Katie Foundry, Galt, Ont.
Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont
Swedish Crucible Steel Co. Windsor.

CARRIERS, PNEUMATIC TUBE
Jones & Glassco, Montreal

CARS, INDUSTRIAL
Can. Blower & Forge Co., Kitchener, Ont
Can. Fairbanks-Morse Co., Ltd, Montreal
Elec. Steel & Metals, Welland, Ont.
MacKinnon Steel Co., Sherbrooke, Que.
Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.

CASTINGS, MACHINERY
Wilson & Co., J. C., Belleville, Ont.

CASTINGS, ALUMINUM, BRASS BRONZE, COPPER, AND GUN METAL
Algoma Steel Corp., Sault Ste. Marie.
Brockville Foundry Co., Brockville, Ont.
Franklin Mfg. Co., Syracuse, N.Y.
Canada Metal Co., Ltd., Toronto, Ont.

CASTINGS, DIE CAST
Canada Metal Co., Ltd., Toronto, Ont.
Franklin Mfg. Co., Syracuse, N.Y.

CASTINGS, STEEL—ALL KINDS
Electric Steel & Metals Co., Welland.
Mesta Machine Co., Pittsburgh, Pa.

CARRIERS COUPLING BOLTS
John Morrow Screw & Nut Co., Ingersoll
Alexander Fleck, Ltd., Ottawa
Greenleafs Ltd., Belleville, Ont.
St. Lawrence Welding Co., Montreal.
Tallman Brass & Metal Co., Hamilton.

CASTINGS, BENCH LEG.
Brown & Sharpe Mfg. Co., Providence, R.I.

CASTINGS, BRASS AND IRON
Algoma Steel Corp., Sault Ste. Marie
International Machinery and Supply Co., Ltd., Montreal, Que.

CASTINGS, BUILDING
Katie Foundry, Galt, Ont.

CASTINGS, GRAY IRON
Bernard Industrial Co., A., Fortierville, Q.
Brown & Sharpe Mfg. Co., Providence, R.I.
Bruce Brass Co., Ltd., Hamilton.
Alexander Fleck, Ltd., Ottawa.
Gardner & Son, Robt., Montreal.
Greenleafs, Ltd., Belleville, Ont.
Hull Iron & Steel Foundries, Ltd., Hull
International Malleable Iron Co., Guelph
Kennedy & Sons, Ltd., Wm., Owen Sound
Katie Foundry, Ltd., Galt, Ont.
Hamilton Co., Wm., Peterboro
Wilson & Co., J. C., Belleville, Ont.

CASTINGS, PLUMBERS'
Katie Foundry, Galt, Ont.

CASTINGS, NICHROME
Can. Driver-Harris Co., Ltd., Walkerville

CASTINGS, HARDWARE
Katie Foundry, Galt, Ont.

CASTINGS, STEEL CHROME AND MANGANESE STEEL
Thos. Davidson Mfg. Co., Montreal, Que.
Dom. Foundries & Steel, Hamilton, Ont.
Hull Iron & Steel Foundries, Ltd., Hull.
Kennedy & Sons, Ltd. Owen Sound

CASTINGS, MALLEABLE
International Malleable Iron Co., Guelph

CASTINGS, NICKEL STEEL
Hull Iron & Steel Foundries, Ltd., Hull.

CEMENT, IRON
Warmington & Co., J. N., Montreal, P.Q.

CEMENT, ELASTIC JOINTING
Warmington & Co., J. N., Montreal, P.Q.

CEMENT MACHINERY
Can. Fairbanks-Morse Co., Ltd., Montreal.
Gardner, Robt., & Son, Montreal.

CEMENT HANDLING MACHINERY
Can. Link-Belt Co., Toronto, Ont.

CENTERING MACHINES
Victoria Foundry Co., Ottawa, Ont.

CENTRE REAMERS
Bertram & Sons Co., John, Dundas
Butterfield & Co., Inc., Rock Island, Que
Gardner, Robt. & Son, Montreal
Hurlburt, Rogers Mch. Co., South Sudbury, Mass.
Morrow Screw & Nut Co., J. Ingersoll, Ont
Niles-Bement-Pond Co., New York
Pratt & Whitney Co., Dundas, Ont.
Wells Bros. Co. of Canada, Galt, Ont.
Whitman & Barnes Mfg. Co., Akron, O.

CHAIN, WELDED COIL
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

CHAIN BLOCKS
Aikenhead Hardware Co., Toronto, Ont.
Can. Fairbanks-Morse Co., Ltd. Montreal
Ford Chain Block & Mfg. Co., Phila., Pa.
Garlock-Walker Machy. Co., Toronto.
Morris Crane & HoistCo., Herbert, Niagara Falls, Ont.
Rice Lewis & Son, Toronto, Ont.
Williams & Wilson, Ltd., Montreal, Que.
Jones & Glassco, Montreal, Que.

CHAINS, AGRICULTURAL
Morse Chain Co., Ithaca, New York.

CHAINS, AUTOMOBILE ENGINE
Morse Chain Co., Ithaca, New York.

CHAINS, BICYCLE, DRIVE AND BLOCK
Morse Chain Co., Ithaca, New York.

CHAINS, FOR ELEVATORS AND CONVEYORS
Can. Link-Belt Co., Toronto, Ont.
Morse Chain Co., Ithaca, N.Y.
Williams & Wilson, Ltd., Montreal, Que.

CHAIN, MALLEABLE, DETACHABLE AND RIVETED
Can. Link-Belt Co., Toronto, Ont.
Morse Chain Co., Ithaca, N.Y.
Williams & Wilson Ltd., Montreal, Que.

CHAINS, POWER TRANSMISSION
Morse Chain Co., Ithaca, N.Y.

CHAINS, SPROCKET WHEEL
Morse Chain Co., Ithaca, N.Y.

CHAIN DRIVES
Can. Link-Belt Co., Toronto, Ont.
Coventry Chain Co., Coventry, England.
Jones & Glassco, Montreal, Que.
Morse Chain Co., Ithaca, N.Y.

CHASERS
National Acme Co., Cleveland, Ohio.
Taylor, J. A. M., 318 Stair Bldg., Toronto, Ont.

CHEMISTS
Toronto Testing Labitory, Ltd., Toronto

CHISELS
Whitman & Barnes Co., St. Catharines.

CHUCKS, AERO, AUTOMATIC
Garvin Machine Co., New York

CHUCKS, CENTERING
Hoggeson & Pettis Mfg. Co., New Haven, Conn.

CHUCKS, COLLET, AIR
Elliott & Whitehall Mach. & Tool Co. Galt Ont
Smalley General Co., Inc., Bay City, Mich.
Williams & Wilson, Ltd., Montreal, Que.

CHUCKS, DRILL, LATHE AND UNIVERSAL
Aikenhead Hardware Co., Toronto, Ont.
Almond Mfg. Co., Ashburnham, Mass
Bicknell-Thomas Co., Greenfield, Mass.
Bertram & Sons Co., John, Dundas
Can. Blower & Forge Co., Kitchener, Ont.
Can. Fairbanks-Morse Co., Ltd., Montreal
Cushman Chuck Co., Hartford, Conn
Foss Machy. & S'ply Co., G. F., Montreal.
Gardner, Robt., & Son, Montreal
Garlock-Walker Mach'y Co., Toronto.
Gisholt Machine Co., Madison, Wis
Hanlinge Bros., Chicago, Ill.
Hoggeson & Pettis Mfg. Co., New Haven Conn.
Jacobs Mfg. Co., Hartford, Conn
Modern Tool Co., Erie, Pa.
Rice Lewis & Son, Toronto, Ont.
Skinner Chuck Co., New Britain, Conn.
Whiton Machine Co., D. E., New London, Conn.
Williams & Wilson Ltd., Montreal, Que

CHUCKS, DRILL, AUTOMATIC AND KEYLESS
Aikenhead Hardware Co., Toronto, Ont
Bicknell-Thomas Co., Greenfield, Mass.
Can. Blower & Forge Co., Kitchener.
Whitney Mfg. Co., Hartford, Conn

CHUCKS, FRICTION AND TAP
Bicknell-Thomas Co., Greenfield, Mass.
Victor Tool Co., Warnerboro, Pa.

CHUCKS, MACHINE MILLING
Hoggeson & Pettis Mfg. Co., New Haven Conn.

CHUCKS, MAGNETIC
Heald Machine Co., Worcester, Mass
Williams & Wilson, Ltd., Montreal, Que.

CHUCKS, RING WHEEL
Ford-Smith Mach. Co., Hamilton, Ont.
Gardner Machine Co., Beloit, Wis.

CHUCKS, WHEEL, CAR
Hoggeson & Pettis Mfg. Co., New Haven, Conn.

CHUCKING MACHINES
Brown & Sharpe Mfg. Co., Providence, R.I.
Garvin Machine Co., New York
Gisholt Machine Co., Madison, Wis.
National Acme Co., Windsor, Vt.
Niles-Bement-Pond Co., New York
Rodefson Machine & Tool Co., Toronto.
Warner & Swasey Co., Cleveland, O.
Wood Turret Mach. Co., Brazil Ind.
Williams & Wilson, Ltd., Montreal, Que

CIRCULATING SYSTEMS FOR LUBRICATING OIL
Power Co., Ltd., S. F., Toronto, Ont
Williams & Co., J. H., Brooklyn, N.Y.

CLAMPS, BELT
Hoggeson & Pettis Mfg. Co., New Haven, Conn.

CLEANERS, METER, WASTE, GENERAL
Oakley Chemical Co., New York, N.Y.

CLEANING COMPOUND
Oakley Chemical Co., New York.

CLOCK SPRINGS
The Dunbar Brothers Co., Bristol, Conn.

CLOCKS, WATCHMAN, PORTABLE
Gisholt Machine Co., Madison, Wis.
Hanlinge Bros., Inc., Chicago, Ill.

CLUTCHES, CHAIN
Wright Mfg. Co., Lisbon, Ohio.

CLUTCHES, FRICTION AND PULLEY
Bernard Industrial Co., A., Fortierville, Q.
Can. Link-Belt Co., Toronto, Ont.
Carlyle Johnson Mach. Co., Manchester, Conn.
Positive Clutch & Pulley Wks., Akron, Ohio
Jones & Glassco, Montreal, Que.
Williams & Wilson Ltd., Montreal, Que.

COAL HANDLING MACHINERY
Can. Link-Belt Co., Toronto, Ont.
Dominion Bridge Co., Montreal, Que.
MacGovern & Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville, Ont.
Williams & Wilson, Limited, Montreal.
Nova Scotia Steel & Coal Co., New Glasgow, N.S.

COLD ROLLED STRIP, ALL METAL COLLARS, SHAFTING
Can. Driver-Harris Co., Ltd., Walkerville.
Wilson & Co., J. C., Belleville, Ont.
Williams & Co., J. H., Brooklyn, N.Y.
Williams & Wilson Ltd., Montreal, Que.

COLLECTORS, PNEUMATIC
Can. Blower & Forge Co., Kitchener.
J. C. Wilson & Co., Belleville, Ont.

COLLETS
Becker Milling Machine Co., Boston.
Hanlinge Bros., Inc., Chicago, Ill.
Wilson & Co., J. C. Belleville, Ont.

COMPOSITION INGOT
Brown's Copper & Brass Rolling Mills, New Toronto.
Canada Metal Co., Toronto, Ont.

COMPOUNDS, CUTTING AND GRINDING, DRAWING, STAMPING
Oakley Chemical Co., New York, N.Y.

COMBINED OPEN SIDE PLANER-SHAPER
Lynd-Fairquhar Co., Boston, Mass.

COMPRESSORS, AIR
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Cleveland Pneumatic Tool Co., Toronto.
Curtis Pneumatic Machy. Co., St. Louis
Elliott & Whitehall, Galt, Ont.
Garlock-Walker Machy. Co., Toronto.
Hinckley Machine Co., Hinckley, Ill.
MacGovern & Co., Montreal, Que.
Williams & Wilson, Ltd., Montreal, Que

CONDENSERS
MacGovern & Co., Montreal, Que.
Smalley General Co., Inc., Bay City, Mich.

CONNECTING RODS
Canada Found'ls & Forgings, Ltd., Welland, Ont.

CONTRACT WORK
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Ford Smith Machine Co., Hamilton, Ont.
Homer & Wilson, Hamilton, Ont.
Katie Foundry, Ltd., Galt, Ont.
Marten Machine Co., Hamilton, Ont.
St. Lawrence Welding Co., Montreal.
Victoria Foundry Co., Ottawa.
Wilson & Co., J. C., Belleville, Ont.
Windsor Mach. Tool Co., Windsor, Ont.

CONTROLLERS, MAGNETIC BRAKES, ELEC. WINCHES, MONO RAIL HOISTS
Volta Mfg. Co., Welland, Ont.

CONTROLLERS AND STARTERS
Williams Mach'y Co., A. R., Toronto.

CONTROLLING INSTRUMENTS
Taylor Instrument Co., Rochester, N.Y.

CONVERTERS, ROTARY
MacGovern & Co., Montreal, Que.

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Jones & Glassco, Montreal.

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Puro Sanitary Drinking Fountain Co., Haydenville, Mass.

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Bertram & Sons Co., John, Dundas, Ont.
Garlock-Walker Machinery Co., Toronto.
Niles-Bement-Pond Co., New York.
Can. Blower & Forge Co., Kitchener.

COPPER, BUS BAR, SHEET, PATES, RODS
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COTTER PINS
Whitman & Barnes Co., St. Catharines.

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Blanche Co., L. C., New York City.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Mach. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Whitman & Barnes Mfg. Co., Akron, O.

COUNTERSHAFTS
Almond Mfg. Co., Ashburnham, Mass.
Brown & Sharpe Mfg. Co., Providence, R.I.
Gray Ball Bearing Co., Ltd., Toronto.
Baird Machine Co., Bridgeport, Conn.
Ford-Smith Machine Co., Hamilton, Ont.
Foster Machine Co., Elkhart, Ind.
Williams & Wilson, Ltd., Montreal, Que.

COUPLINGS, FRICTION
Bernard Industrial Co., The A., Fortierville, Que.
Can. Link-Belt Co., Toronto, Ont.
Williams & Wilson Ltd., Montreal, Que

COUPLINGS, RAPID HOSE
Int. Machinery & Supply Co., Ltd., Montreal, Que.

COILING MACHINERY, WIRE AND SPRING
Garlock-Walker Machinery Co., Toronto.

COKE AND COAL
Hanna & Co., M. A., Cleveland, O.

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Gardner, Robt. & Son, Montreal.
Independent Pneumatic Tool Co., Chicago
Wilson & Co., J. C., Belleville, Ont.

CRANES, LOCOMOTIVE
Can. Link-Belt Co., Toronto, Ont.
Northern Crane Works, Walkerville.

CRANES, OVERHEAD, HAND AND ELECTRIC
Volta Manufacturing Co., Welland, Ont.

CUPS, OIL
Can. Winkley Co., Ltd., Windsor, Ont.

COVERS, OIL HOLE
Can. Winkley Co., Ltd., Windsor, Ont.

CRANES, GANTRY
Can. Link Belt Co., Toronto, Ont.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.

CRANE RUNWAYS
MacKinnon Steel Co., Sherbrooke, Que.

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Morris Crane and Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.
Wilson & Co., J. C., Belleville.
Williams & Wilson, Ltd., Montreal, Que.

CRANES, TRAVELLING, ELECTRIC AND HAND POWER
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Curtis Pneumatic Machy. Co., St. Louis
Dominion Bridge Co., Montreal.
Hepburn, John T., Ltd., Toronto.
MacKinnon Steel Co., Sherbrooke, Que.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Niles-Bement-Pond Co., New York.
Northern Crane Works, Walkerville.

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Canada Found'n & Forgings Ltd., Welland
Williams & Co., J. H., Brooklyn, N.Y.

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Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
Northern Crane Works, Walkerville.
Rice Lewis & Son, Toronto, Ont.
J. C. Wilson & Co., Belleville, Ont.
Williams & Wilson, Ltd., Montreal, Que.

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Graton & Knight Mfg. Co., Worcester, Mass.

CRUSHERS
Elec. Steel & Metals, Welland, Ont.

CUPOLAS
Can. Blower & Forge Co., Kitchener.
Northern Crane Works, Walkerville.

CURB PUMPS FOR OIL, GASOLINE
Bowser Co., Ltd., S. F., Toronto, Ont.

CURRENT TRANSFORMERS
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J. C. Wilson & Co., Belleville, Ont.
Williams & Wilson, Ltd., Montreal, Que.

CUTTERS, BOLT
See Bolt Cutters.

CUTTERS, GEARS
Brown & Sharpe Mfg. Co., Providence, R.I.
Butterfield & Co., Inc., Rock Island, Que.
Fellows Gear Shaper Co., Springfield, Vt.

CUTTERS, FLUE
Cleveland Pneumatic Tool Co., Toronto.

CUTTER HEADS
Oliver Machinery Co. Grand Rapids, Mich

CUTTERS, PIPE (See Pipe Cutters)

CUTTERS, MILLING
Becker Milling Mach. Co., Boston, Mass.
Boker & Co., Inc., H., Montreal, Que.
Butterfield & Co., Rock Island, Que.
Brown & Sharpe Mfg. Co., Providence, R.I.
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Davidson Tool Mfg. Co., New York, N.Y.
Elliott & Whitehall Mach. & Tool Co., Galt, Ont.
Foss Mchy. & S'ply Co., G. F., Montreal.
Garvin Machine Co., New York.
Illinois Tool Works, Chicago, Ill.
Morse Twist Drill & Machine Co., New Bedford.
Pratt & Whitney Co., Dundas, Ont.
Pilot Steel & Tool Co., Montreal, Que.
Rice Lewis & Son, Toronto, Ont.
Tabor Mfg. Co., Philadelphia, Pa.
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Niles-Bement-Pond Co., New York, N.Y.
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Dominion Bridge Co., Montreal.
Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.

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Joyce-Koebel Co., Inc., New York City.
Wheel Trueing Tool Co., Detroit
Williams & Wilson, Limited, Montreal.

DIAMONDS, CARBON AND BORTZ
Wheel Trueing Tool Co., Detroit

DIAMONDS, BLACK AND ROUGH
Joyce, Koebel & Co., Inc., New York.
Wheel Trueing Tool Co., Windsor, Ont.

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General Steel Co., Milwaukee, Wis.

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Hoggson & Pettis Mfg. Co., New Haven, Conn.

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Wells Bros. of Can., Galt, Ont.
Williams & Wilson Ltd., Montreal, Que.

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Wells Brothers Co., of Canada Galt.

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Butterfield & Co., Rock Island, Que.
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Can. Fairbanks-Morse Co., Montreal.
Foss Mchy. & S'ply Co., G. F., Montreal.
Gardner, Robt. & Son, Montreal.
A. B. Jardine & Co., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
Marshall, Son & Bunney, Toronto.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
National Acme Co., Cleveland, Ohio.
Pilot Steel & Tool Co., Montreal, Que.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Rickert-Shafer Co., Erie, Pa.
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Greenfield Tap & Die Corp., Greenfield, Mass.
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Murchey Machine & Tool Co., Detroit.
National-Acme Co., Cleveland, Ohio.
Pratt & Whitney Co., Dundas, Ont.
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Pratt & Whitney Co., Dundas, Ont.

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Foss Mchy. & S'ply Co., G. F., Montreal.
Garlock-Walker Machinery Co., Toronto
Garvin Machine Co., New York
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Niles-Bement-Pond Co., New York
U. S. Mach. Tool Co., Cincinnati, Ohio.
A. R. Williams Machinery Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

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Kayser Ellison & Co., Ltd., Montreal.
Marshall, Son & Bunney, Toronto.
Norton, Ralph B., Agent, Montreal.
Swedish Steel & Importing Co., Ltd., Montreal.

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Canada Machinery Corp., Galt, Ont.
Silver Mfg. Co., Salem, Ohio
Williams & Wilson, Ltd., Montreal, Que.

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Can. Fairbanks-Morse Co., Montreal.
Foss Mchy. & S'ply Co., G. F., Montreal.
Garlock-Walker Mach. Co., Toronto.
Garvin Machine Co., New York.
Hoefer Mfg. Co., Freeport, Ill.
Henry & Wright Mfg. Co., Hartford, Conn
A. R. Jardine & Co., Hespeler, Ont.
Landis Tool Co., Waynesboro, Pa.
Nat. Automatic Tool Co., Richmond, Ind.
Niles-Bement-Pond Co., New York
Rockford Drilling Mach. Co., Rockford, Ill

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Canadian Fairbanks-Morse Co., Montreal.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto.
Henry & Wright Mfg. Co., Hartford,
Landis Tool Co., Waynesboro, Pa.
Niles-Bement-Pond Co., New York.
Williams & Wilson, Limited, Montreal.

DRILLING MACHINES, SENSITIVE
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W. F. & John Barnes Co., Rockford, Ill.
Canadian Fairbanks-Morse Co., Montreal.
Canadian Machinery Corp., Galt, Ont.
Geo. F. Foss Mch. & S'ply Co., Montreal
Garlock-Walker Mach. Co., Toronto, Ont.
Henry & Wright Mfg. Co., Hartford, Conn.
Landis Tool Co., Waynesboro, Pa.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
United States Mach. Tool Co., Cincinnati
Williams & Wilson, Limited, Montreal.

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Can. Blower & Forge Co., Kitchener.
Canada Mach. Corp., Galt, Ont.
Ford Smith Machine Co., Hamilton, Ont.
Garlock Walker Mach. Co., Toronto, Ont.
Hoefer Mfg. Co., Freeport, Ill.
A. B. Jardine & Co., Hespeler, Ont.
Landis Tool Co., Waynesboro, Pa.
R. McDougall Co., Galt.
Nat. Automatic Tool Co., Richmond, Ind.
Rockford Drilling Mach. Co., Rockford, Ill
Niles-Bement Pond Co., New York.
Silver Mfg. Co., Salem, Ohio.
A. R. Williams Machinery Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

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Rice Lewis & Son, Toronto, Ont.
Silver Mfg. Co., Salem, Ohio.

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Can. Blower & Forge Co., Kitchener.
Can. Fairbanks-Morse Co., Montreal.
Geo. F. Foss Mch. & S'ply Co., Montreal
Fry's (London), Ltd., London, England
Garlock-Walker Machinery Co., Toronto.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto Ont.
U.S. Electrical Tool Co., Cincinnati, O.
Williams & Wilson, Ltd., Montreal, Que.

DRILLS, CENTRE
Aikenhead Hardware Co., Toronto, Ont.
Butterfield & Co., Inc., Rock Island, Que.
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Morrow Screw & Nut Co., John, Ingersoll
Morse Twist Drill & Machine Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.
Whitman & Barnes Mfg. Co., Akron, O.
Wilt Twist Drill Co., of Can., Walkerville
Williams & Wilson, Ltd., Montreal, Que.

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Aikenhead Hardware Co., Toronto, Ont.
Butterfield & Co., Inc., Rock Island, Que.
Can. Blower & Forge Co., Kitchener.
Cleveland Twist Drill Co., Cleveland.
Geo. F. Foss Mch. & S'ply Co., Montreal
A. B. Jardine & Co., Hespeler, Ont.
Morrow Screw & Nut Co., John, Ingersoll
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.
Whitman & Barnes Mfg. Co., Akron, O.
Wilkinson & Kompass, Hamilton, Ont.
Wilt Twist Drill Co. of Can., Walkerville

DRILLS, CARBON
Atkins & Co., Ltd., Wm., Sheffield, Eng.
Butterfield & Co., Inc., Rock Island, Que.
Marshall, Son & Bunney, Toronto.
John Morrow Screw & Nut Co., Ingersoll

DRILLS, ELECTRIC, PORTABLE
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener.
Boker & Co., Inc., H., Montreal, Que.
Cincinnati Electrical Tool Co., Cincinnati
Geo. F. Foss Mch. & S'ply Co., Montreal
Independent Pneumatic Tool Co., Chicago.
Niles-Bement Pond Co., New York.
Pilot Steel & Tool Co., Montreal, Que.
Prest-O-Lite Co., Inc., Toronto, Ont.
U. S. Electrical Tool Co., Cincinnati, O.
A. R. Williams Mach. Co., Toronto.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Ltd., Montreal, Que.

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Aikenhead Hardware Co., Toronto, Ont.
Armstrong-Whitworth of Can., Montreal.
Atkins & Co., Ltd., Wm., Sheffield, Eng.
Butterfield & Co., Rock Island, Que.
Cleveland Twist Drill Co., Cleveland.
Canadian Fairbanks-Morse Co., Montreal
H. A. Drury Co., Montreal.
Geo. F. Foss Mch. & S'ply Co. Montreal
Marshall, Son & Bunney, Toronto.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Morse Twist Drill & Machine Co., New Bedford, Mass.
W. F. & John Barnes Co., Rockford, Ill
Plewes, Ltd., Winnipeg, Man.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
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Taylor J. A. M., Stair Bldg., Toronto.
Whitman & Barnes Mfg. Co., Akron, O.
Wilt Twist Drill Co. of Can., Walkerville
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Ltd., Montreal, Que

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Butterfield & Co., Inc., Rock Island, Que.
Cleveland Twist Drill Co., Cleveland.
Morse Twist Drill & Mach. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.

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Niles-Bement-Pond Co., New York.
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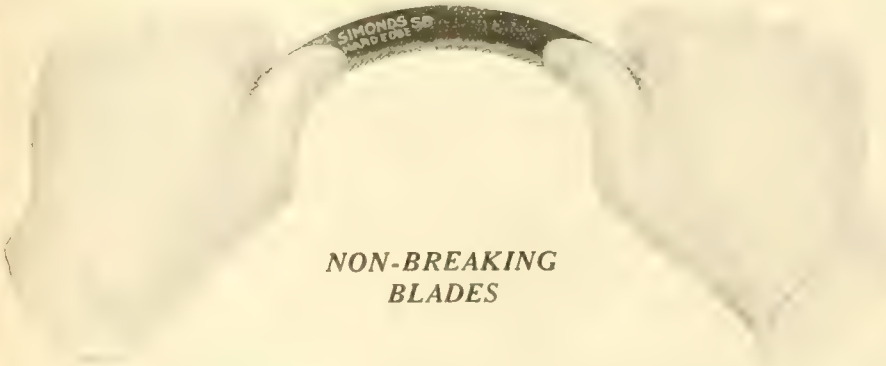

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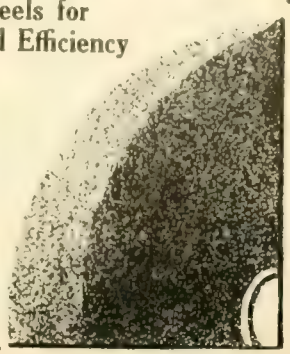

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Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Garlock-Walker Machinery Co., Toronto
Independent Pneumatic Tool Co., Chicago.

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Aikenhead Hardware Co., Toronto, Ont.
Armstrong Bros. Tool Co., Chicago, Ill.
Can. Blower & Forge Co., Kitchener, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Cincinnati Electrical Tool Co., Cincinnati.
Cleveland Twist Drill Co., Cleveland.
Garlock-Walker Mchy. Co., Toronto, Ont.
A. B. Jardine & Co., Hespeler, Ont.
Morrow Screw & Nut Co., John, Ingersoll, Ont.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Co., Dundas, Ont.
Rice Lewis & Son, Toronto, Ont.
Whitman & Barnes Mfg. Co., Akron, O.
Wilt Twist Drill Co. of Can., Walkerville.

DRILLS, ROCK
Can. Ingersoll-Rand Co., Montreal, Que.
Cleveland Pneumatic Tool Co., Toronto,
The Foss Mchy. & Supply Co., Montreal.
A. R. Williams Machy. Co., Toronto.

DRILLS, TRACK
Butterfield & Co., Inc., Rock Island, Que.
Cleveland Twist Drill Co., Cleveland.
The Foss Mchy. & Supply Co., Montreal.
Morrow Screw & Nut Co., J., Ingersoll, Ont
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Wilt Twist Drill Co. of Can., Walkerville.

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DRIVES, CHAIN
See Belting, Chain.

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W. S. Rockwell Co., New York, N.Y.

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Volta Manufacturing Co., Welland, Ont

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Canadian Fairbanks-Morse Co., Montreal.
MacKinnon Steel Co., Sherbrooke, Que.

DUST EXHAUSTER, ARRESTER SYSTEM
Pangborn Corporation, Hagerstown, Md.

DUST HANDLING EQUIPMENT
Pangborn Corporation, Hagerstown, Md.

DUST SEPARATORS
Can. Blower & Forge Co., Kitchener, Ont.

DYNAMOS AND ELECTRICAL SUPPLIES
Canadian Fairbanks-Morse Co., Montreal.
Lancashire Dynamo & Motor Co., Ltd., Toronto.
MacGovern & Co., Montreal, Que.
A. R. Williams Machy. Co., Toronto.

ELECTRICAL SUPPLIES
Can. General Electric Co., Toronto, Ont.

ELECTRIC FURNACES
Volta Manufacturing Co., Welland, Ont.

EECTRIC FURNACE REGULATORS, WINCHES, ROOF COOLERS AND ELECTRODE HOLDERS
Volta Manufacturing Co., Welland, Ont.

ELECTRICAL RESISTANCE MATERIALS, NICHROME, KROMORE, CHROMAX, CLIMAX, NICKEL, SILVER, ADVANCE.
Can. Driver-Harris Co., Walkerville, Ont.

ELECTRIC HOISTS, STATIONARY AND MONO RAIL
Volta Manufacturing Co., Welland, Ont.

ELECTRIC MOTORS
Volta Manufacturing Co., Welland, Ont.

ELEVATOR, ENCLOSURES
Volta Mfg. Co., Welland, Ont.
Canada Wire & Iron Goods Co., Hamilton

ELEVATOR WEIGHTS
Katie Foundry, Galt, Ont.

ELEVATORS AND BUCKETS
Can. Link-Belt Co., Toronto, Ont.
Curtis Pneumatic Machy. Co., St. Louis.
Williams & Wilson, Ltd., Montreal, Que.

ELEVATING AND CONVEYING MACHINERY
Can. Link-Belt Co., Toronto, Ont.
Morris Chain & Hoist Co., Herbert, Niagara Falls, Ont.
Williams & Wilson, Ltd., Montreal, Que.

EMBOSSING PRESSES
Oliver Machinery Co., Grand Rapids, Mich

EMERY GRINDERS (PNEUMATIC)
Cleveland Pneumatic Tool Co., Toronto.
Ford Smith Machine Co., Hamilton, Ont.

EMERY AND EMERY WHEELS
Brantford Emery Wheel Co., Brantford, Canada.
The Foss Mchy. & Supply Co., Montreal.
Garvin Machine Co., New York.
Canadian Fairbanks-Morse Co., Montreal.
Canada Emery Wheels Co., Hamilton.
Ford-Smith Mach. Co., Hamilton, Ont.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Montreal.
Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Ltd., Montreal, Que.

EMERY WHEEL DRESSINGS
Wheel Trueing Tool Co., Windsor, Ont.

END MILLS
John Morrow Screw & Nut Co., Ingersoll

ENGINEERS—INDUSTRIAL CLEANING (Free Consultation)
Oakley Chemical Co., New York, N.Y.

ENGINES, STEAM, GAS, GASOLINE
Canadian Fairbanks-Morse Co., Montreal.
Johnson Mach. Co., Carlyle, Manchester, Conn.
MacGovern & Co., Montreal, Que.

ENGINES, HORIZONTAL AND VERTICAL
Johnson Mach. Co., Carlyle, Manchester, Conn.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

ENGINES, MARINE
Can. Ingersoll-Rand Co., Sherbrooke, Que.

ENGRAVERS
Pritchard-Andrews Co., Ottawa.

ESCUTCHEON PINS
Parmenter & Bulloch, Gananoque, Ont.

EXHAUST HEADS AND HOODS
Can. Blower & Forge Co., Kitchener, Ont.
Canadian Fairbanks-Morse Co., Montreal.

EXHAUSTERS
Can. Blower & Forge Co., Kitchener, Ont.
Pangborn Corporation, Hagerstown, Md.
Williams & Wilson, Ltd., Montreal, Que.

EXTRACTORS, TAP
Walton Co., The, Hartford, Conn.

EYE BOLTS AND NUTS
Can. Foundries & Forgings, Ltd., Welland, Ont.

EYE PROTECTORS
Standard Optical Co., Geneva, N.Y.
Strong, Kennard & Nutt Co., Cleveland.
Willson & Co., Inc., T. A., Reading, Pa.

FACTORY GATES
Page Steel & Wire Co., Adrian, Mich.

FACTORY LOCATIONS
[illegible] St. John, Quebec

FACTORY SITES
[illegible] St. John, Q.

FANS
Baird Machine Co., Bridgeport, Conn
Can. Blower & Forge Co., Kitchener, Ont.

FENCING, WIRE
Page Steel & Wire Co., New York, N.Y.
Williams & Wilson, Ltd., Montreal, Que.

FENCE, IRON AND FACTORY
Can. Wire & Iron Goods, Hamilton, Ont.
Page Steel & Wire Co., Adrian, Mich.

FERRO-TUNGSTEN
Vanadium-Alloys Steel Co., Pittsburgh, Pa

FILES
Aikenhead Hardware Co., Toronto, Ont.
Atkins & Co., Wm., Sheffield, Eng.
Ingersoll File Co., Ltd., Ingersoll, Ont.
Morrow Screw & Nut Co., J., Ingersoll, Ont
Marshall, Son & Bunney, Toronto, Ont.
Nicholson File Co., Port Hope, Ont.
Rice Lewis & Son, Toronto, Ont.
Simonds Mfg. Co., Fitchburg, Mass.
Whitman & Barnes Mfg. Co., Akron, O.
Wilkinson & Kompass, Hamilton, Ont.

FILTERING AND CIRCULATING SYSTEMS FOR LUBRICATING OIL
Bowser Co., Ltd., S. F., Toronto, Ont.
Can. Wire & Iron Goods, Hamilton, Ont.

FINISHING MACHINES
Brown & Sharpe Mfg. Co., Providence, R.I.

FIRST AID CABINETS
Strong, Kennard & Nutt Co., Cleveland.

FIRE EXTINGUISHERS
Strong, Kennard & Nutt Co., Cleveland, O.

FIXTURES
Brown Engineering Corp., Toronto, Ont.
Elliott & Whitehall Mach. & Tool Co., Galt, Ont.
Illinois Tool Works, Chicago, Ill.
Marten Machine Co., Hamilton, Ontario.
Toronto Tool Co., Toronto, Ont.

FLAT SPRINGS
The Dunbar Brothers Co., Bristol, Conn.

FLANGING CLAMPS
Wickes Bros., Saginaw, Mich.

FLOTATION MACHINERY
Elec. Steel & Metals, Welland, Ont.

FLUMES
William Hamilton Co., Peterboro, Ont.

FORGES, HAND PORTABLE
Aikenhead Hardware Co., Toronto, Ont.
Can. Blower & Forge Co., Kitchener
A. B. Jardine & Co., Ltd., Hespeler, Ont.
Rice Lewis & Son, Toronto, Ont.

FORGINGS, STEEL AND IRON
Blancke Co., L. C., New York City.

FORGINGS
Mesta Machine Co., Pittsburgh, Pa.
Can. Found. & Forgings, Ltd., Welland.
Nova Scotia Steel & Coal Co., New Glasgow, N.S.

FORGINGS, DROP, AUTOMOBILE AND LOCOMOTIVE FORGING AND WELDING
Blancke Co., L. C., New York City.
Dominion Bridge Co., Montreal, Que.
Dom. Forge & Stamp'g Co., Walkerville.
Steel Co. of Canada, Ltd., St. Catharines.
Victoria Foundry Co., Ottawa.
Williams & Co., J. H., Brooklyn, N.Y.

FORGING MACHINERY
John Bertram & Sons Co., Dundas, Ont.
Bliss, E. W., Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Ont.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machy. Co., Toronto, Ont.
National Machy. Co., Tiffin, Ohio.
Williams & Wilson, Ltd., Montreal, Que.

FORGINGS, SPECIAL
Armstrong-Whitworth of Can., Montreal.
Blancke Co., L. C., New York City.
Can. Found. & Forgings, Ltd., Welland.
Williams & Co., J. H., Brooklyn, N.Y.

FORMING
Brown & Sharpe Mfg. Co., Providence, R.I.

FOUNTAINS, DRINKING
Puro Sanitary Drinking Fountain Co., Haydenville, Mass.

FRICTION LEATHERS
Graton & Knight Mfg. Co., Montreal.

FRICTION SURFACE BELTING
Can. Consolidated Rubber Co., Montreal.

FUEL OIL SYSTEMS
Bowser Co., Ltd., S. F., Toronto, Ont.
Gilbert & Barker Mfg. Co., Springfield.

FURNACES, ANNEALING, CASE HARDENING AND TEMPERING
Belleville Furnace Co., Detroit, Mich
Brown & Sharpe Mfg. Co., Providence, R.I.
Chicago Flexible Shaft Co., Chicago, Ill.
Gilbert & Barker Mfg. Co., Springfield.
Mechanical Eng'r'g Co., Three Rivers, Q.
W. S. Rockwell Co., New York, N.Y.
Standard Fuel Engr. Co., Detroit, Mich
Williams & Wilson, Ltd., Montreal, Que.

FURNACES, BLAST
Belleville Industrial Furnace Co., Detroit.
W. S. Rockwell Co., New York, N.Y.
Toronto Iron Works, Ltd., Toronto.

FURNACES, FORGING
Gilbert & Barker Mfg. Co., Springfield
W. S. Rockwell Co., New York, N.Y.

FUSE BOXES, STEEL
Dom. Forge & Stamp. Co., Walkerville

GANG PLANER TOOLS
Armstrong Bros. Tool Co., Chicago

GAS AND STEAM ENGINES
Mesta Machine Co., Pittsburgh, Pa

GASKETS, LEATHER, ETC.
Graton & Knight Mfg. Co., Montreal.

GASOLINE METERS
Bowser Co., Ltd., S. F., Toronto, Ont

GASOLINE TANKS
Bowser Co., Ltd., S. F., Toronto, Ont

GASOLINE PUMPS, SELF-MEASURING
Bowser Co., Ltd., S. F., Toronto, Ont
Brown & Sharpe Mfg. Co., Providence, R.I.

GAUGES
Elliott & Whitehall Mach. & Tool Co., Galt, Ont.

GAUGERS, CALIPERS
Williams & Co., J. H., Brooklyn, N.Y.

GAUGES, MERCURY COLUMN, DRAFT
Taylor Instrument Co., Rochester, N.Y.

GAUGES, HYDRAULIC
Taylor Instrument Co., Rochester, N.Y.

GAUGES, MANUFACTURERS, LIMIT, THREAD
Greenfield Tap & Die Corp., Greenfield.
Wells Bros. of Can., Galt, Ont.

GAUGES, STANDARD
Brown Engineering Corp., Toronto, Ont.
Canadian Fairbanks-Morse Co., Montreal.
Cleveland Twist Drill Co., Cleveland.
Garvin Machine Co., New York.
Illinois Tool Works, Chicago, Ill.
C. E. Johanson, Inc., Toronto, Ont.
Morse Twist Drill & Machine Co., New Bedford.
Peck, Stow & Wilcox Co., Southington, Conn.
Pratt & Whitney Co., Hartford, Conn.
Taylor, J. A. M., 318 Stair Bldg. Toronto
Toronto Tool Works, Toronto, Ont.
Wells Brothers Co. of Canada, Galt, Ont.
Worth Engineering Co., Toronto, Ont.

GAUGES, THREAD
Bicknell-Thomas Co., Greenfield, Mass.

GAUGES, VACUUM AND PRESSURE
Bristol Co., Waterbury, Conn.
Taylor Instrument Co., Rochester, N.Y.

GAUGES, SNAP, THREAD AND CYLINDRICAL
C. E. Johanson, Inc., Toronto, Ont.

GEAR BLANKS
Can. Steel Foundries, Ltd., Montreal.
Dom. Found. & Steel, Hamilton, Ont.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.
Wilson & Co., J. C., Belleville, Ont.
Williams & Co., J. H., Brooklyn, N.Y.

GEAR BLANKS, CAST
Katie Foundry, Galt, Ont.

GEAR SHAPERS AND CUTTERS
Fellows Gear & Shaper Co., Springfield, V.

GEAR-CUTTING MACHINERY
Bilton Mach. Tool Co., Bridgeport, Conn.
Fellows Gear & Shaper Co., Springfield, V.
Garlock-Walker Mchy. Co., Toronto, Ont.
D. E. Whiton Machine Co., New London, Conn.
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

GEAR-TESTING MACHINE
Gisholt Machine Co., Madison, Wis.

GEAR-TURNING MACHINES, BEVEL
Bridgeford Mach. Tool Wks, Rochester

GEAR BOXES, REDUCTION
Coventry Chain Co., Coventry, Eng.

GEARS, CHAIN
Morse Chain Co., Ithaca, New York.

GEARS, COMPENSATING
Morse Chain Co., Ithaca, New York.

GEARS, CUT, MORTISE, ANGLE, WORM
Baxter & Co., Ltd., J. R., Montreal.
Can. Link-Belt Co., Toronto, Ont.
Dominion Bridge Co., Montreal, Que.
Dom. Foundries & Steel, Hamilton, Ont.
Elliott & Whitehall, Galt, Ont.
Gardner, Robt., & Son, Montreal.
Grant Gear Works, Boston, Mass.
Hamilton Gear & Machine Co., Toronto.
Hull Iron & Steel Found., Ltd., Hull, Q.
Illinois Tool Works, Chicago, Ill.
Jones & Glassco, Montreal.
Wm. Kennedy & Sons, Ltd., Owen Sound, Ont.
Philadelphia Gear Works, Philadelphia
Victoria Foundry Co., Ottawa.
Wilson & Co., J. C., Belleville, Ont.

GEARS, RAWHIDE
Gardner, Robt., & Son, Montreal.
Grant Gear Works, Boston, Mass.
Hamilton Gear & Machine Co., Toronto.
Jones & Glassco, Montreal.
Philadelphia Gear Works, Philadelphia.
A. R. Williams Machy. Co., Toronto.

GENERATORS, GEAR
Fellows Gear & Shaper Co., Springfield, V.

GEARS, SPRING
Morse Chain Co., Ithaca, New York.

GEARS, SPUN, BENCH, SPIRAL
Brown & Sharpe Mfg. Co., Providence, R.I.

GEARS, SILENT CHAIN GENERATORS, STEAM TURBO
Can. General Electric Co., Toronto, Ont.

GENERAL MACHINE WORK
Elliott & Whitehall Galt, Ont.

GENERATORS AND CONVERTORS
Can. General Electric Co., Toronto, Ont.

GENERATORS, MOTOR
A. R. Williams Machy. Co., Toronto.
Williams & Wilson, Ltd., Montreal.
MacGovern & Co., Montreal.

GERMAN SILVER
Brown's Copper & Brass Rolling Mills, New Toronto, Ont.

GLOVES, ASBESTOS, ACID PROOF, WATERPROOF, ETC.
Strong, Kennard & Nutt Co., Cleveland.

GLUE HEATERS
Oliver Machinery Co., Grand Rapids, Mich

GLASSES, SAFETY
Strong, Kennard & Nutt Co., Cleveland.
Willson & Co., Inc., T. A., Reading, Pa.

GOVERNOR, WATER WHEEL
Wilson & Co., J. C., Belleville, Ont.

GRAPHITE
Aikenhead Hardware, Ltd., Toronto.
Rice Lewis & Son, Toronto.

GOGGLES
Consolidated Optical Co., Toronto.
Standard Optical Co., Geneva, N.Y.
Strong, Kennard & Nutt Co., Cleveland.
Willson & Co., Inc., T. A., Reading, Pa.
Welding & Supplies Co., Montreal.

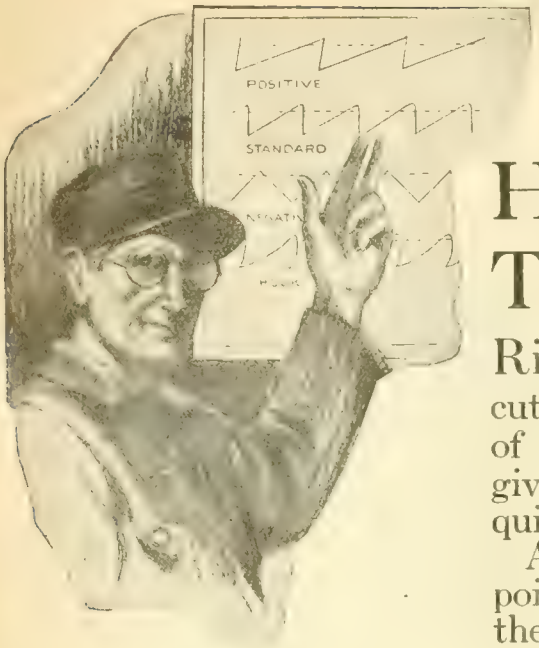
GRAVITY CARRIERS
Can. Link-Belt Co., Toronto, Ont.
Jones & Glassco, Montreal.
Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.

GREASE CUPS, PRESSED STEEL, BRASS
Can. Winkley Co., Ltd., Windsor, Ont.

GREASES (See Lubricants)

GRINDERS, AUTOMATIC KNIFE
Canada Machinery Corp., Galt, Ont.
Foss Mchry. & S'ply Co., G. F., Montreal
Garlock-Walker Machinery Co., Toronto.

GRINDERS, CENTRE COLUMN, PEDESTAL AND BENCH
Wisconsin Electric Co., Inc., Racine, Wis.
Can. Machinery Corp., Galt, Ont.



HACK SAWS AND TOOTH SHAPES

Right down at the bottom of cheaper cutting costs is the shape of the tooth. Years of experiment and actual working tests have given us the "Standard" shape tooth. It 'cuts quicker and lasts longer."

And here's the reason. As a saw is used the points are worn off and the "contact area" of the teeth on the work becomes so great that enough weight to make the teeth "bite" crushes or breaks the blade. In other words, "the saw is dull."

Another thing: In the acute or "positive" angle tooth the leading edge points in the direction of the cut, it's always "digging in" under the surface and most likely to strip. The negative angle tooth simply scrapes off the metal and does not actually cut at all. The hook tooth is under the same handicap as the acute angled tooth. In all unusual teeth the "contact area," the friction producing surface, is greater than with the "Standard" tooth.

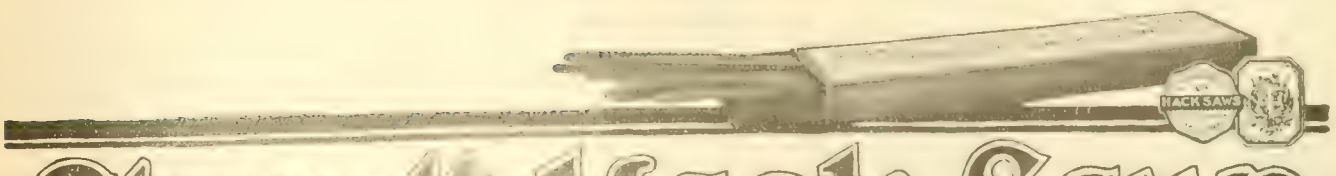
The easiest, surest way to get economy in Hack Saws is to use Starrett Blades with the Starrett Chart. Send for Catalog No. 21 "3"

THE L. S. STARRETT CO.

The World's Greatest Toolmakers
Manufacturers of Hack Saws Unexcelled

ATHOL, MASSACHUSETTS

NEW YORK LONDON CHICAGO



Starrett Hack Saws

Use this letter to be assured.

Cleveland Pneumatic Tool Co. Toronto.
Ford-Smith Mach. Co., Hamilton, Ont.
Foss Mchy. & S'ply Co., G. F., Montreal.
Garlock-Walker Machinery Co., Toronto.
Kattie Foundry, Galt, Ont.
Modern Tool Co., Erie, Pa.
Morse Twist Drill & Machine Co., New Bedford.
Niles-Bement-Pond Co., New York, N.Y.
Perfect Machine Co., Galt, Ont.
United States Elec. Tool Co., Cincinnati
Williams & Wilson Limited Montreal

GRINDERS, CUTTER

Brown & Sharpe Mfg. Co., Providence, R.I
Cincinnati Milling Mach. Co., Cincinnati.
Foss Mchy. & S'ply Co., G. F., Montreal.
Garvin Machine Co., New York.
Greenfield Machine Co., Greenfield, Mass.
Greenfield Tap & Die Corp., Greenfield, M
Heald Machine Co., Worcester, Mass.
Landis Tool Co., Waynesboro, Pa
Manhattan Machine & Tool Co., Grand Rapids, Mich
Norton Co., Worcester, Mass.
Pratt & Whitney Co. Dundas, Ont
Wells Bros. of Can., Galt Ont
Williams & Wilson Ltd. Montreal.

GRINDERS, DIE AND CHASER

Landis Machine Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa
National Acme Co. Cleveland Ohio

GRINDERS, DISK

Armstrong Bros. Tool Co. Chicago, Ill.
Ford-Smith Mach. Co., Hamilton.
Gardner Machine Co. Beloit, Wis.
Heald Machine Co. Worcester, Mass.

GRINDERS, FLEXIBLE CASTING

Manhattan Machine & Tool Co., Grand Rapids, Mich

GRINDERS, DRILL

Aikenhead Hardware Co., Toronto
Foss Mchy. & S'ply Co., G. F., Montreal.
Garvin Machine Co., New York.
Greenfield Tap & Die Corp., Greenfield
United States Elec. Tool Co., Cincinnati
Wells Bros. of Canada, Galt, Ont.
Williams & Wilson Ltd., Montreal.

GRINDERS, CYLINDER, INTERNAL

Brown & Sharpe Mfg. Co., Providence, R.I
Foss Mchy. & S'ply Co., G. F., Montreal.
Greenfield Machine Co., Greenfield, Mass.
Heald Machine Co., Worcester, Mass.
Landis Tool Co., Waynesboro, Pa.
Modern Tool Co., Erie, Pa.
Norton Co., Worcester, Mass.
Williams & Wilson, Ltd., Montreal.

GRINDERS, PORTABLE, ELECTRIC, HAND, TOOL POST, FLOOR AND BENCH

Baird Machine Co., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence, R.I
Cincinnati Electrical Tool Co., Cincinnati.
Ford-Smith Mach. Co., Hamilton, Ont.
Wisconsin Electric Co., Inc., Racine, Wis
Grant Mfg. & Mach. Co., Bridgeport, Con
Garlock-Walker Machinery Co., Toronto.
Greenfield Machine Co., Greenfield, Mass.
Independent Pneumatic Tool Co., Chicago
United States Elec. Tool Co., Cincinnati
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal.
Wilkinson & Kompass, Hamilton, Ont.

GRINDERS, MANUFACTURING

Universal Grinding Mach. Co., Fitchburg, Mass.

GRINDERS, HOLE, HOLE AND FACE AND DEEP HOLE

Bryant Chucking Grinder Co., Springfield, Vermont.
Heald Machine Co., Worcester, Mass.

GRINDERS, PLAIN CYLINDRICAL

Fitchburg Grinding Mach. Co., Fitchburg, Mass.

GRINDERS, PNEUMATIC

Can. Ingersoll-Rand Co., Montreal.
Cleveland Pneumatic Tool Co., Toronto.
Garlock-Walker Machinery Co., Toronto.
Heald Machine Co., Worcester, Mass.
Independent Pneumatic Tool Co., Chicago
MacGovern & Co., Montreal, Que.

GRINDERS, PROFILE

Cleveland Milling Machine Co., Cleveland.

GRINDERS, ROTARY SURFACE

Brown & Sharpe Mfg. Co., Providence, R.I
Bristol Machine Tool Co., Bristol, Conn
Manhattan Machine & Tool Co., Grand Rapids, Mich.

GRINDERS, TOOL AND HOLDER

Armstrong Bros. Tool Co., Chicago.
W. E. & John Barnes Co., Rockford, Ill.
Blount & Co., J. G., Everet, Mass.
Brown & Sharpe Mfg. Co., Providence, R.I
Ford-Smith Machine Co., Hamilton, Ont.
Greenfield Machine Co., Greenfield, Mass.
Greenfield Tap & Die Corp., Greenfield.
National-Acme Co., Cleveland, Ohio.
Tabor Mfg. Co., Philadelphia, Pa.
Wells Bros. of Canada, Galt, Ont.

GRINDERS, UNIVERSAL, PLAIN

Manhattan Machine & Tool Co., Grand Rapids, Mich
Modern Tool Co., Erie, Pa.
Norton Co., Worcester, Mass.
Williams & Wilson, Ltd., Montreal.

GRINDERS, VERTICAL, SURFACE

Brown & Sharpe Mfg. Co., Providence, R.I
Can. Fairbanks-Morse Co., Montreal.
Heald Machine Co., Worcester, Mass
Pratt & Whitney Co., Dundas, Ont.
Gisholt Machine Co., Madison, Wis.
Norton Co., Worcester, Mass.
Williams & Wilson, Ltd., Montreal.

GRINDING AND POLISHING MACHINES, PORTABLE, PNEUMATIC AND SPRING FRAME

Can. Fairbanks-Morse Co., Montreal.
Cincinnati Elec. Tool Co., Cincinnati, O
Ford-Smith Mach. Co., Hamilton, Ont
Gaucher & Son, Robt., Montreal.
Garvin Machine Co., New York
Garlock-Walker Machy. Co., Toronto.
Greenfield Machine Co., Greenfield, Mass.
Hall & Sons, John H., Brantford, Ont.
LeBlond Mch. Tool Co., R. K. Cincinnati
Niles-Bement-Pond Co., New York, N.Y.
Norton Co., Worcester, Mass.
Wisconsin Electric Co., Racine, Wis.
Williams & Wilson, Ltd., Montreal

GRINDING MACHINES, CAR WHEEL, CUTTER, CYLINDRICAL, CRANKSHAFT

Brown & Sharpe Mfg. Co., Providence, R.I
Norton Co., Worcester, Mass.

GRINDING WHEELS

Aikenhead Hardware Co., Toronto, Ont.
Brantford Emery Wheel Co., Brantford.
Can. Fairbanks-Morse Co., Montreal.
Ford-Smith Machine Co., Hamilton, Ont.
Foss Mchy. & S'ply Co., G. F., Montreal
Norton Co., Worcester, Mass.

GUARDS, WINDOW AND MACHINE

Canada Machinery Corp., Galt, Ont.
Canada Wire & Iron Goods Co., Hamilton
Dennis Wire & Iron Works, London, Ont
Page Steel & Wire Co., Adrian, Mich.
Strong, Kennard & Nutt Co., Cleveland

HANDLES, BALANCE, CRANK AND MACHINE

Williams & Co., J. H., Brooklyn, N.Y.

GUTTERS AND SKYLIGHTS

H. H. Robertson, Ltd., Sarnia, Ont.

HACK SAW BLADES

Aikenhead Hardware Co., Toronto, Ont.
Atkins & Co., Ltd., Wm., Sheffield, Eng.
Blancke Co., L. C., New York City.
Boker & Co., Inc., H., Montreal, Que
Can. Fairbanks-Morse Co., Montreal.
Diamond Saw & Stamping Wks., Buffalo.
Ford-Smith Machine Co., Hamilton, Ont.
Kayser, Ellison & Co., Ltd., Montreal.
Marshall, Son & Bremner, Toronto
Norton, Ralph B., Agent, Montreal
Foss Mchy. & S'ply Co., G. F., Montreal.
Fry's (London), Ltd., London, England
Racine Tool & Machine Co., Racine, Wis.
Plewes Ltd., Winnipeg, Man.
Pilot Steel & Tool Co., Montreal, Que.
Rice Lewis & Son, Toronto, Ont.
Simonds Mfg. Co., Fitchburg, Mass.
L. S. Starrett Co., Athol, Mass
Standard Machy. & Supplies, Montreal.
Victor Saw Works, Ltd., Hamilton
Wilkinson & Kompass, Hamilton
Williams & Wilson, Ltd., Montreal.

HACK SAW FRAMES

Aikenhead Hardware Co., Toronto
Can. Fairbanks-Morse Co., Montreal
Ford-Smith Machine Co., Hamilton, Ont
Garvin Machine Co., New York City.
Victor Saw Works, Hamilton, Ont.
Rice Lewis & Son, Toronto, Ont.
Wilkinson & Kompass, Hamilton, Ont
Williams & Wilson, Ltd., Montreal.

HACK SAWS, POWER

Aikenhead Hardware Co., Toronto, Ont.
Can. Fairbanks-Morse Co., Montreal
Diamond Saw & Stamping Wks., Buffalo.
Foss Mchy. & S'ply Co., G. F., Montreal.
Ford-Smith Machine Co., Hamilton.
Peerless Machine Co., Racine, Wis
Racine Tool & Mach. Co., Racine, Wis.
Starrett Co., L. S., Athol, Mass
Victor Saw Works, Hamilton, Ont
Williams Machy. Co., A. R., Toronto
Williams & Wilson, Ltd., Montreal

HAMMERS, HATCHETS

Whitman & Barnes Co., St. Catharines.

HAMMERS (DROP), MOTOR AND BELT DRIVEN

Beaudry & Co., Boston, Mass.
Bliss Co., E. W., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton.
Can. Billings & Spencer, Ltd., Welland.
Canada Machinery Corp., Galt, Ont.
High Speed Hammer Co., Rochester, N.Y.
Jardine & Co., A. B., Hespeler, Ont.
Niles-Bement-Pond Co., New York, N.Y.
Toledo Machine & Tool Co., Toledo.
United Hammer Co., Boston, Mass.
Williams & Wilson, Ltd., Montreal.

HAMMERS, HELVE POWER

Canada Machinery Corp., Galt, Ont.
West Tire Setter Co., Rochester, N.Y.
Williams & Wilson, Limited, Montreal.

HAMMERS, CHIPPING, CAULKING, PNEUMATIC

Can. Ingersoll-Rand Co., Montreal, Que.
Garlock-Walker Machinery Co., Toronto.
Independent Pneumatic Tool Co., Chicago.

HAMMERS, MARKING

Matthews & Co., Jas. H., Pittsburgh, Pa.

HAMMERS, NAIL MACHINE

Rice Lewis & Son, Toronto, Ont.
United Hammer Co., Boston, Mass.

HAMMERS, STEAM

Canada Machinery Corp., Galt, Ont.
Niles-Bement-Pond Co., New York.

HAND PLANERS

Oliver Mchy. Co., Grand Rapids, Mich.

HAND LEATHERS OR PADS

Graton & Knight Mfg. Co., Montreal

HANGERS

Brown & Sharpe Mfg. Co., Providence, R.I

HANGERS, SHAFT

Algoma Steel Corp., Sault Ste. Marie.
Can. General Electric Co. Toronto, Ont.
Chapman Double Ball Bearing Co., Toronto.
Gray Ball Bearing Co., Ltd., Toronto
Baird Machine Co., Bridgeport, Conn
Can. S K F Co. Toronto, Ont
Gardner & Son, Robt., Montreal
Jones & Glassco, Montreal
Standard Pressed Steel Co., Philadelphia
Williams & Wilson, Limited Montreal.

HARDNESS TESTING INSTRUMENTS

Shore Instrument & Mfg. Co., New York.

HEAD, AUXILIARY

Hoefer Mfg. Co., Freeport, Ill.

HEATING AND VENTILATING ENGINEERS

Can. Blower & Forge Co. Kitchener, Ont.

HEAT TREATMENT OF STEEL

Gray Ball Bearing Co., Ltd., Toronto.

HEAT GAUGES, HARDENING AND ANNEALING

Shore Instrument & Mfg. Co., New York

HELMETS, SANDBLAST, AMMONIA

Strong, Kennard & Nutt Co., Cleveland.

HIGH SPEED STEEL

See Steel

HINGE MACHINERY

Baird Machine Co., Bridgeport, Conn.
Illinois Tool Works, Chicago, Ill.

HINGES

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Morris Crane & Hoist Co., Herbert, Niagara Falls, Ont.
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Williams & Wilson, Limited, Montreal.

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Clipper Belt Lacer Co., Grand Rapids.

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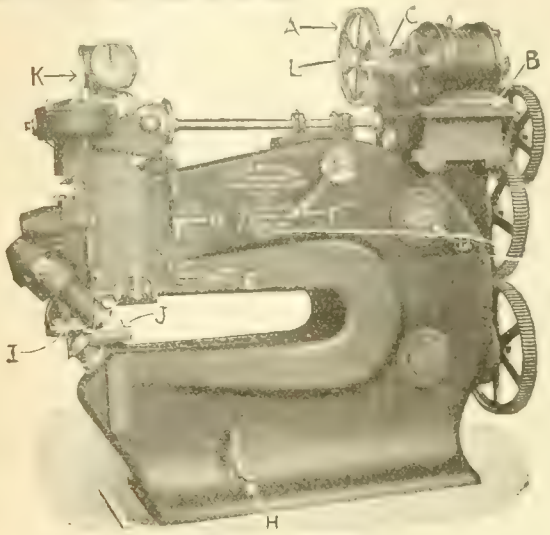

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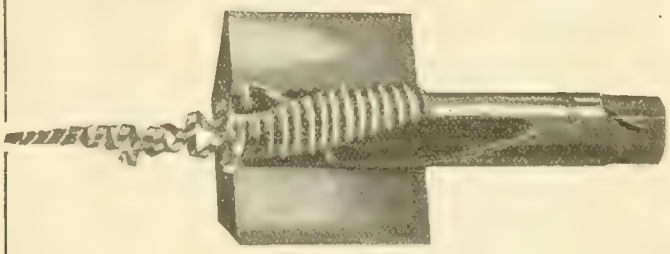

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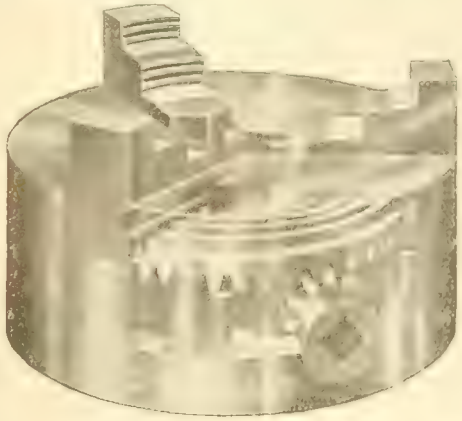

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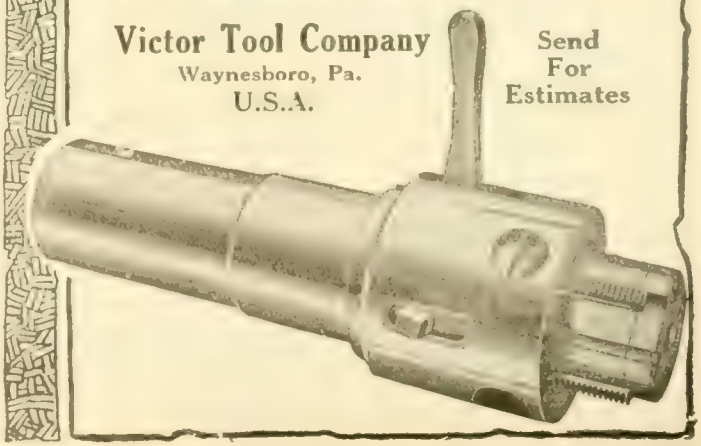

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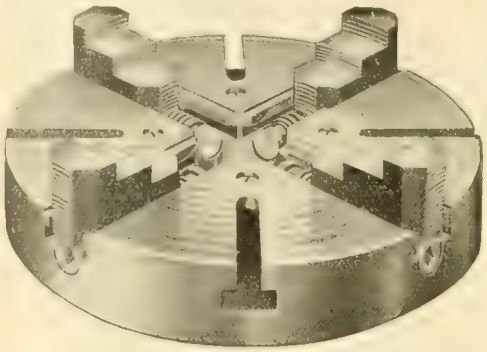

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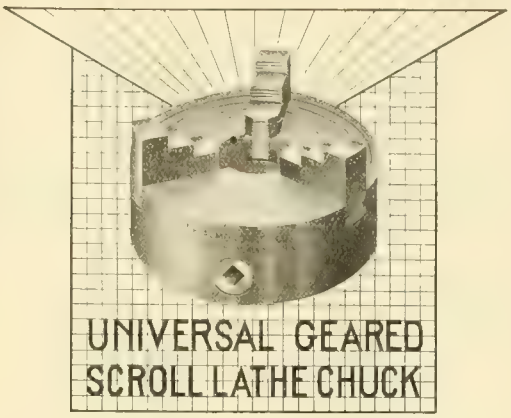

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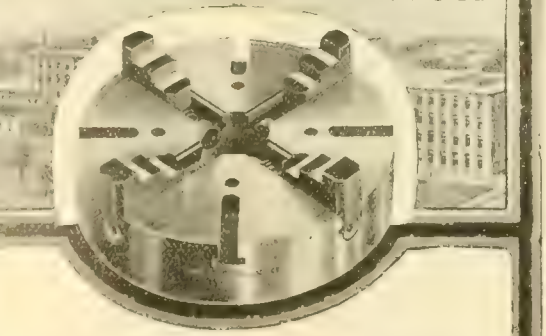

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J. Morrow Screw & Nut Co., Ingersoll, Ont.
Wells Bros. of Can., Galt, Ont.
Whitman & Barnes Mfg. Co., Akron, O.

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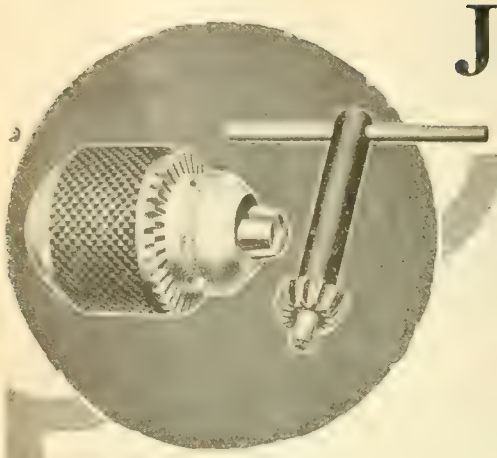

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Perfect Threads

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Made in 9/16", 1", 1½" and 2" sizes.

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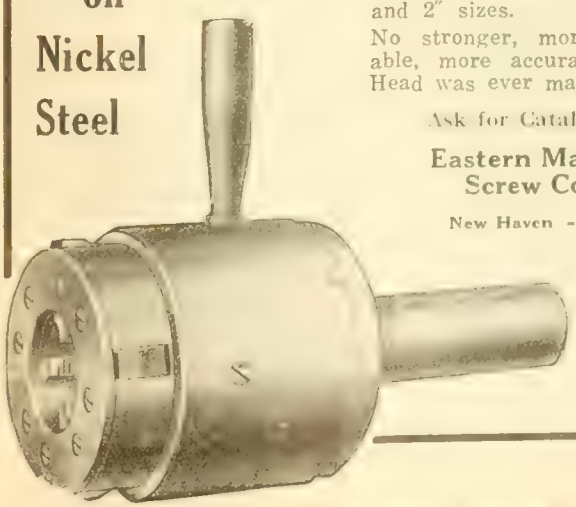

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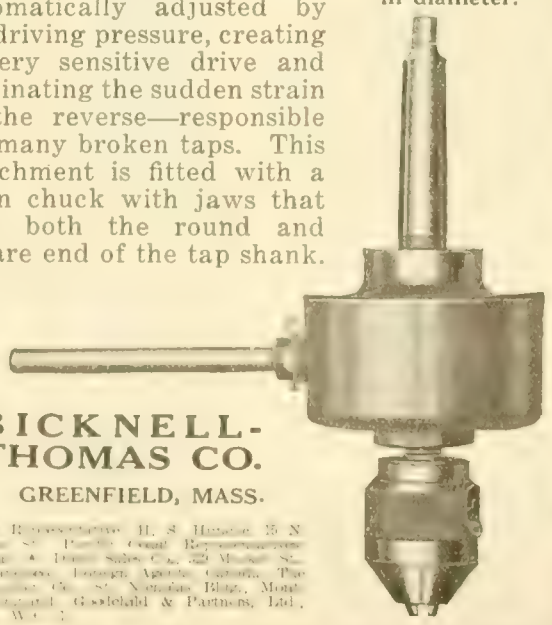
Fits Any Make Drill

A friction mechanism inside the body of the attachment is automatically adjusted by the driving pressure, creating a very sensitive drive and eliminating the sudden strain of the reverse—responsible for many broken taps. This attachment is fitted with a plain chuck with jaws that grip both the round and square end of the tap shank.

Made to take taps from 3-32" to 1-4" in diameter.



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It interested cut out this page and place with letters to be answered.

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RIVETS.
Aikenhead Hardware Co., Toronto, Ont.
Parmenter & Bulloch Co., Gananoque.
Rice, Lewis & Son, Toronto.
Steel Co. of Canada, Ltd., Hamilton.

RIVETERS, PNEUMATIC, HYDRAULIC, HAMMER, COMPRESSION
Can. Fairbanks-Morse Co., Montreal.
Can. Ingersoll-Rand Co., Montreal.
Cleveland Pneumatic Tool Co. of Canada, Toronto.
Garlock-Walker Machinery Co., Toronto.
Independent Pneumatic Tool Co., Chicago.
Niles-Bement-Pond Co., New York.

RIVETING MACHINES, ELASTIC, ROTARY BLOW
Grant Mfg. & Machine Co., Bridgeport.
High-Speed Hammer Co., Rochester.
Williams & Wilson, Ltd., Montreal.
F. B. Shuster Co., New Haven, Conn.

ROAD BUILDING EQUIPMENT
Can. Ingersoll-Rand Co., Ltd., Sherbrooke.

RODS, HIGH SPEED AND CARBON DRILL
Blancke Co., L. C., New York City.

RODS, ROPE AND SPRING
Page Steel & Wire Co., Adrian, Mich.

RODS, PURE NICKEL, MONEL METAL, NICHROME
Can. Driver-Harris Co., Ltd., Walkerville.

ROLL ENGRAVING
Hoggson & Pettis Mfg. Co., New Haven, Conn.

ROLLER CHAINS
Can. Link-Belt Co., Toronto.
Jones & Glassco, Montreal.

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John Bertram & Sons Co., Dundas.
Brown, Boggs Co., Ltd., Hamilton.
Can. Machinery Corp., Galt, Ont.
Garlock-Walker Machinery Co., Toronto.
Niles-Bement-Pond Co., New York.
Toledo Machine & Tool Co., Toledo, O.
Williams & Wilson, Ltd., Montreal, Que.

ROLLS AND TABLES
Elec. Steel & Metals, Welland, Ont.

ROOFING
H. H. Roberts n, Ltd., Sarnia, Ont

ROPE, GALV. MONEL METAL, BRONZE, TILLER AND SASH CORD
Can. Driver-Harris Co., Ltd., Walkerville

ROTARY SHEARS
The Quickwork Co., St. Mary's, Ohio.

ROOF COOLERS
Electric Steels & Metals, Ltd., Welland.

ROLLING MACHINES, SHEET METAL
Manitowoc Machine & Tool Co., Grand Rapids Mach

ROLLING MILL MACHINERY
Mesta Machine Co., Pittsburgh, Pa.

ROLL LATHES
Mesta Machine Co., Pittsburgh, Pa.

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ROLLS, CRUSHING
Can. Link-Belt Co., Toronto

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Elliott & Whitehall, Galt, Ont.

RUBBER MILL DRIVES
Can. Link-Belt Co., Toronto

RUBBER MILL MACHINERY
Bertrams Ltd., Edinburgh, Scotland

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Brown & Sharpe Mfg. Co., Providence
James Chesterman & Co. Ltd., Sheffield
Rice, Lewis & Son, Toronto.
L. S. Starrett Co., Athol, Mass.

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Lufkin Rule Co. of Can., Windsor.

RULES, BOXWOOD, FOLDING
Lufkin Rule Co. of Can., Windsor.

RULES, BOARD AND LONG
Lufkin Rule Co. of Can., Windsor.

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Williams & Wilson, Ltd., Montreal, Que.

SAFETY DEVICES
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SAND MILLS
Frost Mfg. Co., Chicago, Ill.

SAND-BLAST EQUIPMENT
SAND BLAST SUPPLIES AND ACCESSORIES
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SAFETY APPLIANCE GOGGLES
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Pangborn Corporation, Hagerstown, Md.
Pittsburgh Crushed Steel Co., Pittsburgh.

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Can. Sander Mfg. Co., Brockville, Ont.

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Canada Machinery Corp., Galt.
Robert Gardner & Son, Montreal.
Curtis Pneumatic Machy Co., St. Louis.
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Simonds Mfg. Co., Fitchburgh, Mass.
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Hunter Saw & Machine Co., Pittsburgh.
Wells Bros. of Can., Galt, Ont.

SAWS, SLITTING
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Garvin Machine Co., New York.
Greenfield Tap & Die Corp., Greenfield.
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Pratt & Whitney Co., Dundas, Ont.
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Warner & Swasey Co., Cleveland, O.
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Wilkinson & Kompass, Hamilton.

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Greenfield Tap & Die Corp., Greenfield.
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Wilkinson & Kompass, Hamilton.

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Garvin Machine Co., New York.
National Acme Co., Cleveland, O.
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SELF-OPENING DIES
See Dies.

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Geo. F. Foss Mchy. & Sply. Co., Montreal
Robt. Gardner & Son, Montreal.
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Williams & Wilson, Ltd., Montreal.

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Jones & Glassco, Montreal.
Niles-Bement-Pond Co., New York.
Can. Drawn Steel Co., Hamilton.
Pratt & Whitney Co., Dundas.
Rice, Lewis & Son, Toronto.
A. R. Williams Machy. Co., Toronto.
Wilkinson & Kompass, Hamilton, Ont.
Wilson & Co., J. C., Belleville, Ont.
Williams & Wilson, Ltd., Montreal, Que.

SHARPENING STONES
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Rice, Lewis & Son, Toronto.

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Bertrams Ltd., Edinburgh, Scotland.
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machy. Co., Ltd., Toronto
A. B. Jardine & Co., Hespeler, Ont.
Niles-Bement-Pond Co., New York.
Toledo Machine & Tool Co., Toledo, O.

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Garlock-Walker Machy. Co., Ltd., Toronto
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Wickes Bros., Saginaw, Mich.
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Toledo Machine & Tool Co., Toledo, O
Williams & Wilson Ltd., Montreal, Que.

SHEARS, ROTARY
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The Quickwork Co., St Mary's, Ohio.

SHEARS, PNEUMATIC
Toledo Machine & Tool Co., Toledo, Ohio.

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Peck, Stow & Wilcox Co., Southington.

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Can. Driver-Harris Co., Ltd., Walkerville.

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SHEARS, SPLITTING
Marshalltown Mfg. Co., Marshalltown, Ia
Peck, Stow & Wilcox Co., Southington.

SHEARS, IRREGULAR AND CIRCLE CUTTING
The Quickwork Co., St. Mary's, Ohio.
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SHEET METAL MACHINERY
Peck, Stow & Wilcox Co., Southington, C.

SHEARS, SERPENTINE
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Peck, Stow & Wilcox Co., Southington, C.
D. H. Stoll Co., Inc., Buffalo, N.Y.
Williams & Wilson, Ltd., Montreal.

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Wilkinson & Kompass, Hamilton, Ont.

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Katie Foundry, Galt, Ont.

SLINGS, CHAINS
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Garvin Machine Co., New York.
National-Acme Co., Cleveland, Ohio.
Niles-Bement-Pond Co., New York.

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Morse Twist Drill & Mch. Co., New Bedford, Mass.
Rice Lewis & Son, Toronto, Ont.
Whitman & Barnes Mfg. Co., Akron, O.

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Katie Foundry, Galt, Ont.

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Brown, Boggs & Co., Hamilton, Ont.
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Canada Metal Co., Ltd., Toronto, Ont.
Rice Lewis & Son, Toronto, Ont.
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Garlock-Walker Machinery Co., Toronto,
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Brown Engineering Corp., Toronto, Ont.
Ford-Smith Machine Co., Hamilton, Ont.
Garlock-Walker Machinery Co., Toronto.
Elliott & Whitehall Mach. & Tool Co., Galt, Ont.
Garvin Machine Co., New York.
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Jones & Glassco, Montreal.
Morse Chain Co., Ithaca, N.Y.
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Wilson & Co., J. C., Belleville, Ont.

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See Balls Steel.

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Atkins & Co., Ltd., Wm., Sheffield, Eng.
Marshall, Son & Bunney, Toronto.

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Rice Lewis & Son, Toronto, Ont.
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Warmington & Co., J. N., Montreal, P.Q.

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Marshall Son & Bunney, Toronto
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Kayser Ellison & Co., Sheffield, Eng.
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Ltd., Winnipeg, Man.
Pilot Steel & Tool Co., Montreal, Que.
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Swedish Steel & Importing Co., Ltd., Montreal.
Vanadium-Alloys Steel Co., Pittsburgh.

STEEL, CHROME, MANGANESE
Joilette Steel Co., Montreal, Que.

STEEL, OPEN HEARTH
Illingworth Steel Co., John, New York.

STEEL, CRUSHED
Pittsburgh Crushed Steel Co., Pittsburgh.

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Norton, Ralph B., Agent, Montreal.

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MacKinnon Steel Co., Sherbrooke, Que.

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Blaneke Co., L. C., New York City.
Boker & Co., Inc., H., Montreal, Que.
Can. Fairbanks-Morse Co., Montreal.
Drury Co., H. A., Montreal, Que.
Firth & Sons, Thos., Montreal, Que.
Hawkridge Bros. Co., Boston, Mass
Kayser-Ellison & Co., Ltd., Montreal.
Marshall, Son & Bunney, Toronto, Ont.
Norton, Ralph B., Agent, Montreal
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Rice Lewis & Son Toronto, Ont.
Vanadium-Alloys Steel Co., Pittsburgh.

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Kayser Ellison & Co., Ltd., Montreal.
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Wells Bros., of Can., Galt, Ont.

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Rice Lewis & Son, Toronto, Ont.
Wells Bros., Co., of Canada, Galt, Ont.

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Bertrams, Ltd., Edinburgh, Scotland

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STRUCTURAL STEEL WORKS
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SUPPLIES, RUBBER MFRS.
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Whitman & Barnes Co., St. Catharines.

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TABLES, SAND-BLAST
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St. Lawrence Welding Co., Montreal.
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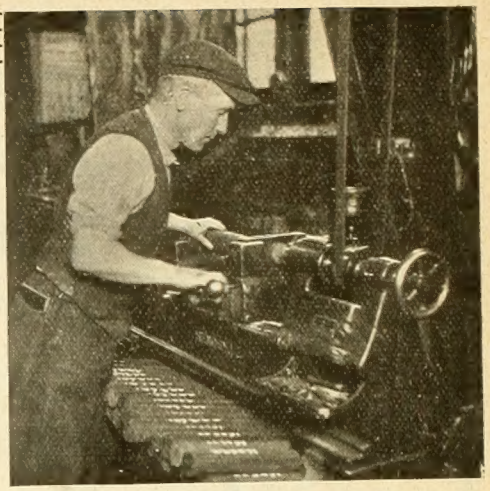

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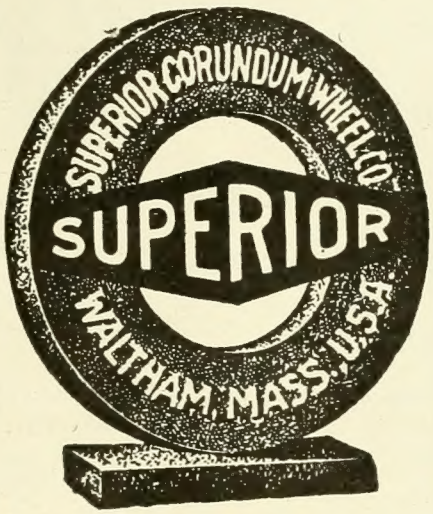

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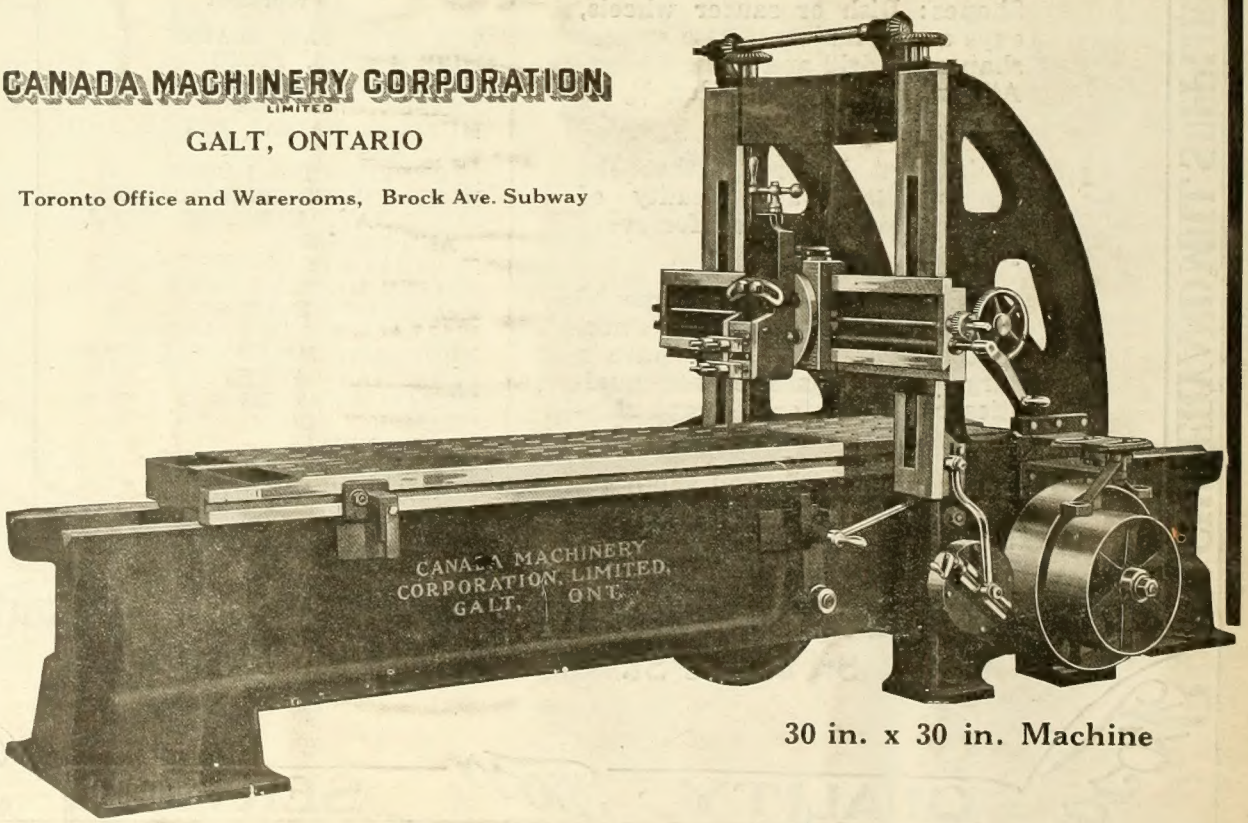

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